

DRAFT
**ENVIRONMENTAL ASSESSMENT
OF INSTALLATION DEVELOPMENT
AT
GRAND FORKS AIR FORCE BASE, NORTH DAKOTA**



HEADQUARTERS AIR MOBILITY COMMAND

MAY 2010

ACRONYMS AND ABBREVIATIONS

µg/m ³	micrograms per cubic meter	DERP	Defense Environmental Restoration Program
2, 4-D	2, 4-dichlorophenoxyacetic acid	DHEWQ	North Dakota Department of Health & Environmental Division of Water Quality
319 ARW	319th Air Refueling Wing	DNL	day-night average A-weighted sound level
319 CES/CEA	319th Civil Engineering Squadron/Asset Management	DOD	Department of Defense
319 MSG/LGRF	319th Mission Support Group	DWQ	Division of Water Quality
ACHP	Advisory Council on Historic Preservation	EA	Environmental Assessment
ACM	asbestos-containing material	EIAP	Environmental Impact Analysis Process
AFB	Air Force Base	EIS	Environmental Impact Statement
AFI	Air Force Instruction	EISA	Energy Independence and Security Act
AFOSH	Air Force Occupational and Environmental Safety, Fire Protection, and Health	EO	Executive Order
AFPD	Air Force Policy Directive	EOD	Explosive Ordnance Disposal
AICUZ	Air Installation Compatible Use Zone	ERP	Environmental Restoration Program
AMC	Air Mobility Command	ESA	Endangered Species Act
AOC	Area of Concern	ETL	Engineering Technical Letter
APE	Area of Potential Effect	ESCP	erosion-and sediment-control plan
APZ	Accident potential zone	ESPC	Energy Savings Performance Contract
AQCR	Air Quality Control Region	FAA	Federal Aviation Administration
ARPA	Archaeological Resource Protection Act	FAMCAMP	Family Camp
AST	aboveground storage tank	FEMA	Federal Emergency Management Agency
AT/FP	antiterrorism/force protection	FONPA	Finding of no Practicable Alternative
BAT	Best Available Technology	FONSI	Finding of No Significant Impact
BASH	Bird-Wildlife Aircraft Strike Hazard	ft ²	square feet
bgs	below ground surface	FUB	Facilities Utilization Board
BMP	best management practices	FY	fiscal year
BRAC	Base Realignment and Closure	GFMSA	Grand Forks Metropolitan Statistical Area
CAA	Clean Air Act	GHG	greenhouse gas
CATEX	Categorical Exclusion	GIS	Geographical Information System
CATM	Combat Arms Training and Maintenance	gpm	gallons per minute
CEQ	Council on Environmental Quality	GSHP	Ground Source Heat Pumps
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	HAER	Historic American Engineering Record
CFR	Code of Federal Regulations	HAP	hazardous air pollutant
CH 3	County Highway 3	HAZMART	hazardous materials pharmacy
CO	carbon monoxide	HQ	Headquarters
CO ₂	carbon dioxide	HMMP	hazardous material management program
CWA	Clean Water Act	HUD	U.S. Department of Housing and Urban Development
CZ	clear zone	HVAC	Heating, Ventilation, and Air Conditioning
CZMA	Coastal Zone Management Act		
dBA	A-weighted decibels		

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HWAS	hazardous waste accumulation site
I	Interstate
ICRMP	Integrated Cultural Resources Management Plan
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
IDEA	Installation Development Environmental Assessment
INRMP	Integrated Natural Resources Management Plan
JP-8	Jet Propellant-8
km	kilometers
LBP	lead-based paint
LEED	Leadership in Energy and Environmental Design
LTF	land treatment facility
MBTA	Migratory Bird Treaty Act
MFH	Military Family Housing
mg/m ³	milligrams per cubic meter
MMRP	Military Munitions Response Program
MSA	Munitions Storage Area
MSDS	Material Safety Data Sheets
MSL	mean sea level
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NDAAQS	North Dakota Ambient Air Quality Standards
NDDH	North Dakota Department of Health
NDPDES	North Dakota Pollutant Discharge Elimination System
NEC	Nodak Electric Cooperative
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOA	Notice of Availability
NO _x	nitrogen oxides
NO ₂	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
ntu	nephelometric turbidity units
O&M	Operations and Maintenance
O ₃	ozone
ODS	ozone-depleting substance

OSHA	Occupational Safety and Health Administration
P2	Pollution Prevention
PA	Programmatic Agreement
Pb	lead
PC	Program Comment
PCB	polychlorinated biphenyl
pCi/L	picocuries per liter
P.L.	Public Law
PM _{2.5}	particulate matter equal to or less than 2.5 microns in diameter
PM ₁₀	particulate matter equal to or less than 10 microns in diameter
POL	Petroleum, Oils, and Lubricants
ppm	parts per million
PSD	Prevention of Significant Deterioration
QD	quantity-distance
QRP	Qualified Recycling Program
RCRA	Resource Conservation and Recovery Act
ROI	Region of Influence
RPA	Remotely Piloted Aircraft
SAP	satellite accumulation point
SDWA	Safe Drinking Water Act
SDZ	Safety Danger Zone
SFS	Security Forces Squadron
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO ₂	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasures
SQG	small-quantity generator
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan
tpy	tons per year
TSCA	Toxic Substance Control Act
UAS	Unmanned Aircraft Systems
UFC	Unified Facilities Criteria
US 2	U.S. Highway 2
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
VOC	volatile organic compound

COVER SHEET

DRAFT

ENVIRONMENTAL ASSESSMENT OF INSTALLATION DEVELOPMENT AT GRAND FORKS AIR FORCE BASE, NORTH DAKOTA

Responsible Agencies: U.S. Air Force (USAF), Headquarters Air Mobility Command (AMC), Scott Air Force Base (AFB), Illinois; and Grand Forks AFB, North Dakota.

Affected Location: Grand Forks AFB.

Proposed Action: Implementation of approved installation development plans.

Report Designation: Draft Environmental Assessment (EA).

Abstract: Grand Forks AFB uses numerous 319th Air Refueling Wing- (319 ARW) approved plans to project installation development requirements. These plans propose demolition, construction, and infrastructure improvement activities intended to ensure that the installation can sustain its current and future national security operations and mission-readiness status. These projects include installation development projects contained in the *General Plan: Grand Forks Air Force Base, ND*, and the community of all existing 319 ARW-approved development plans. Grand Forks AFB seeks to improve the continuing installation development process by evaluating in a single EA all actions proposed in the 319 ARW-approved community of plans for installation development, called the Installation Development EA (IDEA). The Proposed Action includes numerous projects, such as demolition of aging facilities, new facility construction, facility upgrades, facility repair and renovation, utilities upgrades, community living upgrades, infrastructure upgrades, and recreational upgrades that would be completed or implemented during the next 5 years. The intent of this IDEA is to address the Proposed Action of implementing installation development actions as found in the community of all existing approved plans concerning continuing development on Grand Forks AFB to ensure future mission and facility requirements are met. The scope of the IDEA includes an evaluation of alternatives for the various projects and an analysis of the cumulative effects on the natural and man-made environments.

Through this IDEA, Grand Forks AFB provides a constraints-based environmental impact analysis of installation development actions projected over the next 5 years. A constraints approach enables Grand Forks AFB to evaluate environmental concerns that exist throughout the installation and those unique to specific areas of the installation. The analysis draws from the knowledge gained from extensive recent evaluations for similar types of projects to determine the direct, indirect, and cumulative effects of projects that would be completed as part of the installation's development.

The IDEA has been prepared to evaluate the Proposed Action and alternatives, including the No Action Alternative. Resources that were considered in the impacts analysis are noise, land use, air quality, safety, geological resources, water resources, biological resources, cultural resources, socioeconomic resources and environmental justice, infrastructure, and hazardous materials and waste management.

Written comments and inquiries regarding this document should be directed to the Public Affairs Office, 319th Air Refueling Wing, 375 Steen Boulevard, Suite 12, Grand Forks Air Force Base, North Dakota, 58205. Telephone calls can be directed to 701-747-5023, and email comments should be addressed to 319ARW.PA@grandforks.af.mil. Anyone wishing to view the supporting documents for this action should contact the 319 ARW Public Affairs Office within the next 30 days at 701-747-5023, or view the documents on the Web site at <http://www.grandforks.af.mil/library/>.

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Your comments on this document are welcome. Letters or other written comments provided to the proponent concerning this document may be published in this EA. Comments will normally be addressed in this EA and made available to the public. Any personal information provided will be used only to identify your desire to make a statement during the public comment period or to fulfill requests for copies of this EA or associated documents. Private addresses will be compiled to develop a mailing list for those requesting copies of this EA. However, only the names of the individuals making comments and specific comments will be disclosed; personal home addresses and phone numbers will not be published in this EA.

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**HEADQUARTERS AIR MOBILITY COMMAND
COMMUNITY PLANNING BRANCH
507 SYMINGTON DRIVE
SCOTT AIR FORCE BASE, ILLINOIS 62225-5022**

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TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS INSIDE FRONT COVER
COVER SHEET

1. PURPOSE, NEED, AND SCOPE	1-1
1.1 BACKGROUND	1-1
1.2 PURPOSE OF AND NEED FOR THE PROPOSED ACTION	1-3
1.3 SCOPE OF THE ANALYSIS.....	1-3
1.4 SUMMARY OF KEY ENVIRONMENTAL COMPLIANCE REQUIREMENTS	1-4
1.4.1 National Environmental Policy Act	1-4
1.4.2 Integration of Other Environmental Statutes and Regulations.....	1-5
1.4.3 Interagency Coordination and Public Involvement	1-6
1.5 ORGANIZATION OF THIS DOCUMENT.....	1-6
2. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES	2-1
2.1 PROPOSED ACTION	2-1
2.1.1 Major Installation Constraints	2-12
2.1.2 Demolition Projects.....	2-14
2.1.3 Construction Projects	2-15
2.1.4 Infrastructure Projects	2-15
2.1.5 Summary of Proposed Activities.....	2-16
2.2 ALTERNATIVES.....	2-17
2.2.1 Alternative 1 – Acquire Privately Owned Land Surrounding Grand Forks AFB	2-17
2.2.2 Alternative 2 – Lease Additional Facilities in the Surrounding Community	2-17
2.2.3 No Action Alternative	2-17
2.3 DECISION TO BE MADE AND IDENTIFICATION OF THE PREFERRED ALTERNATIVE	2-18
3. AFFECTED ENVIRONMENT	3-1
3.1 NOISE.....	3-1
3.1.1 Definition of the Resource	3-1
3.1.2 Existing Conditions	3-2
3.2 LAND USE	3-3
3.2.1 Definition of the Resource	3-3
3.2.2 Existing Conditions	3-4
3.3 AIR QUALITY	3-6
3.3.1 Definition of the Resource	3-6
3.3.2 Existing Conditions	3-8
3.4 GEOLOGICAL RESOURCES	3-9
3.4.1 Definition of the Resource	3-9
3.4.2 Existing Conditions	3-9
3.5 WATER RESOURCES	3-10
3.5.1 Definition of the Resource	3-10
3.5.2 Existing Conditions	3-13

TABLE OF CONTENTS (CONTINUED)

3.6	BIOLOGICAL RESOURCES	3-16
3.6.1	Definition of the Resource	3-16
3.6.2	Existing Conditions	3-16
3.7	CULTURAL RESOURCES.....	3-22
3.7.1	Definition of the Resource	3-22
3.7.2	Existing Conditions	3-23
3.8	SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE	3-25
3.8.1	Definition of the Resource	3-25
3.8.2	Existing Conditions	3-26
3.9	INFRASTRUCTURE.....	3-29
3.9.1	Definition of the Resource	3-29
3.9.2	Existing Conditions	3-30
3.10	HAZARDOUS MATERIALS AND WASTE.....	3-33
3.10.1	Definition of the Resource	3-33
3.10.2	Existing Conditions	3-34
3.11	SAFETY	3-41
3.11.1	Definition of the Resource	3-41
3.11.2	Existing Conditions	3-41
4.	ENVIRONMENTAL CONSEQUENCES	4-1
4.1	INTRODUCTION.....	4-1
4.2	ENVIRONMENTAL CONSEQUENCES OF THE NO ACTION ALTERNATIVE	4-6
4.3	ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION BY RESOURCE AREA.....	4-6
4.3.1	Noise.....	4-6
4.3.2	Land Use	4-7
4.3.3	Air Quality.....	4-8
4.3.4	Geological Resources	4-9
4.3.5	Water Resources.....	4-10
4.3.6	Biological Resources.....	4-11
4.3.7	Cultural Resources	4-14
4.3.8	Socioeconomics and Environmental Justice	4-15
4.3.9	Infrastructure	4-16
4.3.10	Hazardous Materials and Waste.....	4-20
4.3.11	Safety.....	4-22
4.4	DETAILED ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION	4-23
4.4.1	Representative Demolition Projects	4-23
4.4.1.1	D1. Demolish MSA Area Revised Plan (Buildings 712, 717, 719, 723 to 727, 729, 737, and 738)	4-23
4.4.1.2	D2. Demolish Buildings 304 and 515 in support of Construct Consolidated Security Forces.....	4-29
4.4.1.3	D3. Demolish Hangars 520, 521, 522, and 523	4-33
4.4.2	Representative Construction Projects.....	4-37
4.4.2.1	C1. Construct Consolidated Security Forces	4-37
4.4.2.2	C2. Construct BCE Pavements and Maintenance Facility/Snow Barn.....	4-43
4.4.2.3	C3. Construct Indoor Small Arms Range	4-48

TABLE OF CONTENTS (CONTINUED)

4.4.3	Representative Infrastructure Projects.....	4-55
4.4.3.1	11. Construct Access Road/Parking at Buildings 314 and 242	4-55
4.4.3.2	12. Repair HVAC-GSHP at Building 652	4-59
4.4.3.3	13. Repair Runway-Mill and Overlay (S/R).....	4-64
4.4.4	Analysis of All Proposed IDEA Projects	4-68
5.	CUMULATIVE AND ADVERSE IMPACTS	5-1
5.1	DEFINITION OF CUMULATIVE EFFECTS	5-1
5.2	PROJECTS IDENTIFIED WITH THE POTENTIAL FOR CUMULATIVE EFFECTS.....	5-1
5.3	CUMULATIVE EFFECTS ANALYSIS.....	5-2
5.4	REASONABLE AND PRUDENT MEASURES AND BEST MANAGEMENT PRACTICES	5-2
5.5	UNAVOIDABLE ADVERSE IMPACTS	5-9
5.6	COMPATIBILITY OF THE PROPOSED ACTION AND ALTERNATIVES WITH THE OBJECTIVES OF FEDERAL, REGIONAL, STATE, AND LOCAL LAND USE PLANS, POLICIES, AND CONTROLS.....	5-9
5.7	RELATIONSHIP BETWEEN THE SHORT-TERM USE OF THE ENVIRONMENT AND LONG- TERM PRODUCTIVITY	5-9
5.8	IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES	5-10
6.	LIST OF PREPARERS	6-1
7.	REFERENCES	7-1

APPENDICES

- A. Applicable Laws, Regulations, Policies, and Planning Criteria**
- B. Interagency and Intergovernmental Coordination for Environmental Planning Correspondence**
- C. Air Quality Emission Calculations**
- D. Species of Conservation Concern and State-listed Breeding Birds at Grand Forks AFB**
- E. List of All Facilities on Grand Forks AFB Approaching 50 Years by 2014**
- F. Documentation on NRHP Eligibility Evaluations, SHPO Concurrence, and ACHP Program Comments**
- G. Management Requirements and Environmental Protection Measures for Wetlands and other Waters of the United States**

FIGURES

1-1	Grand Forks AFB and Surrounding Area	1-2
2-1	Locations and Environmental Constraints of All Projects Associated with the Proposed Action (North).....	2-7
2-2	Locations and Environmental Constraints of All Projects Associated with the Proposed Action (South).....	2-8
2-3	Grand Forks AFB Existing Land Use Categories	2-10
2-4	Representative Projects Related to Known Constraints at Grand Forks AFB	2-11
3-1	Water Resources at Grand Forks AFB.....	3-15
3-2	Vegetation Cover on Grand Forks AFB.....	3-17
3-3	Unemployment Percentages, 1999 to 2009.....	3-28
3-4	SWMUs at Grand Forks AFB	3-40
4-1	Environmental Constraints Associated with Project D1	4-24
4-2	Environmental Constraints Associated with Project D2	4-29
4-3	Environmental Constraints Associated with Project D3	4-34
4-4	Environmental Constraints Associated with Project C1	4-38
4-5	Environmental Constraints Associated with Project C2	4-43
4-6	Environmental Constraints Associated with Project C3	4-49
4-7	Environmental Constraints Associated with Project I1	4-55
4-8	Environmental Constraints Associated with Project I2.....	4-60
4-9	Environmental Constraints Associated with Project I3.....	4-65

TABLES

2-1	Proposed Facilities Demolition Projects	2-2
2-2	Proposed Facilities Construction Projects.....	2-3
2-4	Representative Demolition Projects	2-14
2-5	Representative Construction Projects.....	2-15
2-6	Representative Infrastructure Projects	2-16
2-7	Change in Impervious Surfaces.....	2-16
3-1	Typical Outdoor Noise Levels	3-2
3-2	Predicted Noise Levels for Construction Equipment.....	3-3
3-3	Land Use Categories of Representative Projects	3-6
3-4	National and State Ambient Air Quality Standards	3-7
3-5	Local and Regional Air Emissions Inventory for the Proposed Action (2002)	3-9
3-6	Properties of Soils Mapped at the Proposed Representative Projects	3-11
3-7	Species of Conservation Priority Observed on Grand Forks AFB.....	3-21
3-8	Population Data for 1990, 2000, and 2008.....	3-26
3-9	Overview of Employment by Industry, 2000.....	3-27
3-10	Minority, Low-income, and Poverty Status for 2000.....	3-29
3-11	ERP Sites and AOC at Grand Forks AFB.....	3-39
4-1	Estimated Noise Levels Resulting from Demolition and Construction Activities.....	4-7
4-2	Estimated Air Emissions Resulting from All Proposed Action Projects	4-9
4-3	Status of NRHP Evaluation and SHPO Consultation for Buildings to be Demolished Under the Proposed Action.	4-16
4-4	Anticipated Generation of Construction and Demolition Debris	4-21
4-5	Estimated Air Emissions Resulting from Project D1	4-25
4-6	Estimated Air Emissions Resulting from Project D2.....	4-30
4-7	Estimated Air Emissions Resulting from Project D3.....	4-35

TABLES (CONTINUED)

4-8	Estimated Air Emissions Resulting from Project C1	4-39
4-9	Estimated Air Emissions Resulting from Project C2	4-45
4-10	Estimated Air Emissions Resulting from Project C3	4-51
4-11	Estimated Air Emissions Resulting from Project I1	4-56
4-12	Estimated Air Emissions Resulting from Project I2	4-61
4-13	Estimated Air Emissions Resulting from Project I3	4-66
4-14	Potential Environmental Consequences from All Proposed Projects Listed in Tables 2-1, 2-2, and 2-3	4-70
5-1	Cumulative Effects on Resources	5-4

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1. Purpose, Need, and Scope

The 319th Air Refueling Wing (319 ARW) at Grand Forks Air Force Base (AFB), North Dakota, and Headquarters (HQ) Air Mobility Command (AMC) believe a comprehensive U.S. Air Force (USAF) Environmental Impact Analysis Process (EIAP) document would improve the continuing activity of installation development and streamline the National Environmental Policy Act (NEPA) compliance process. As a result, 319 ARW and HQ AMC have initiated an evaluation in this Environmental Assessment (EA) of all programmed and reasonably foreseeable projects identified for the next 5 fiscal years (FYs), FY 2010 to FY 2014. Since the establishment of Grand Forks AFB, as with all other USAF installations, development of the installation has occurred continuously. Every year in the history of the installation, structures have been demolished, new facilities constructed, and infrastructure upgraded. This document will constitute an Installation Development EA (IDEA). The intent of the IDEA is to address the Proposed Action of implementing installation development actions as found in the community of all existing 319 ARW-approved plans on Grand Forks AFB. These projects are a compilation of installation development activities as described in the Grand Forks AFB General Plan (USAF 2006) and all other known and 319 ARW-approved installation plans. The community of installation development plans is linked to individual funding programs, such as Base Realignment and Closure (BRAC), Military Construction, Operations and Maintenance, Military Family Housing, Anti-Terrorism/Force Protection (AT/FP), Nonappropriated Funds, and others. The Grand Forks AFB community of plans was examined to provide a consolidated list of projects that are planned and programmed over the next 5 FYs for the continued physical development of the installation to support air mobility missions and other readiness training and operational assignments. In addition to evaluating the projects as described in this document, this IDEA will serve as a baseline for future environmental analysis of mission and training requirements.

These plans provide for future development of the installation to accommodate future mission and facility requirements, and include projects for transportation improvements, airfield and utility infrastructure enhancements, development constraints and opportunities, and land use relationships.

This section of the document includes five subsections: background information on the location and mission of Grand Forks AFB, a statement of the purpose of and the need for the Proposed Action, an overview of the scope of the analysis, a summary of key environmental compliance requirements, and an introduction to how the IDEA is organized.

1.1 Background

Grand Forks AFB is in Grand Forks County near the North Dakota-Minnesota state boundary. The installation is north of and adjacent to the City of Emerado and is 15 miles west of the City of Grand Forks (see **Figure 1-1**). This military installation is a 5,773-acre USAF installation under the command and control of AMC. The 319 ARW, which serves as the host wing, maintains its mission as the first core refueling wing in the AMC, and *guarantees global reach by providing extended range in the air-transporting of people and cargo where and when they are needed by the United States*. Other tenants on Grand Forks AFB include the 373rd Training Squadron Detachment, the Air Force Audit Agency, Department of Homeland Security, and the U.S. Army Corps of Engineers (USACE). The average daily population of Grand Forks AFB is 4,919 people, which includes military personnel, family members, Department of Defense (DOD) employees, and civilian contractors. Active-duty strength is approximately 1,693 military and 376 civilian employees (Vanderhoff 2010).

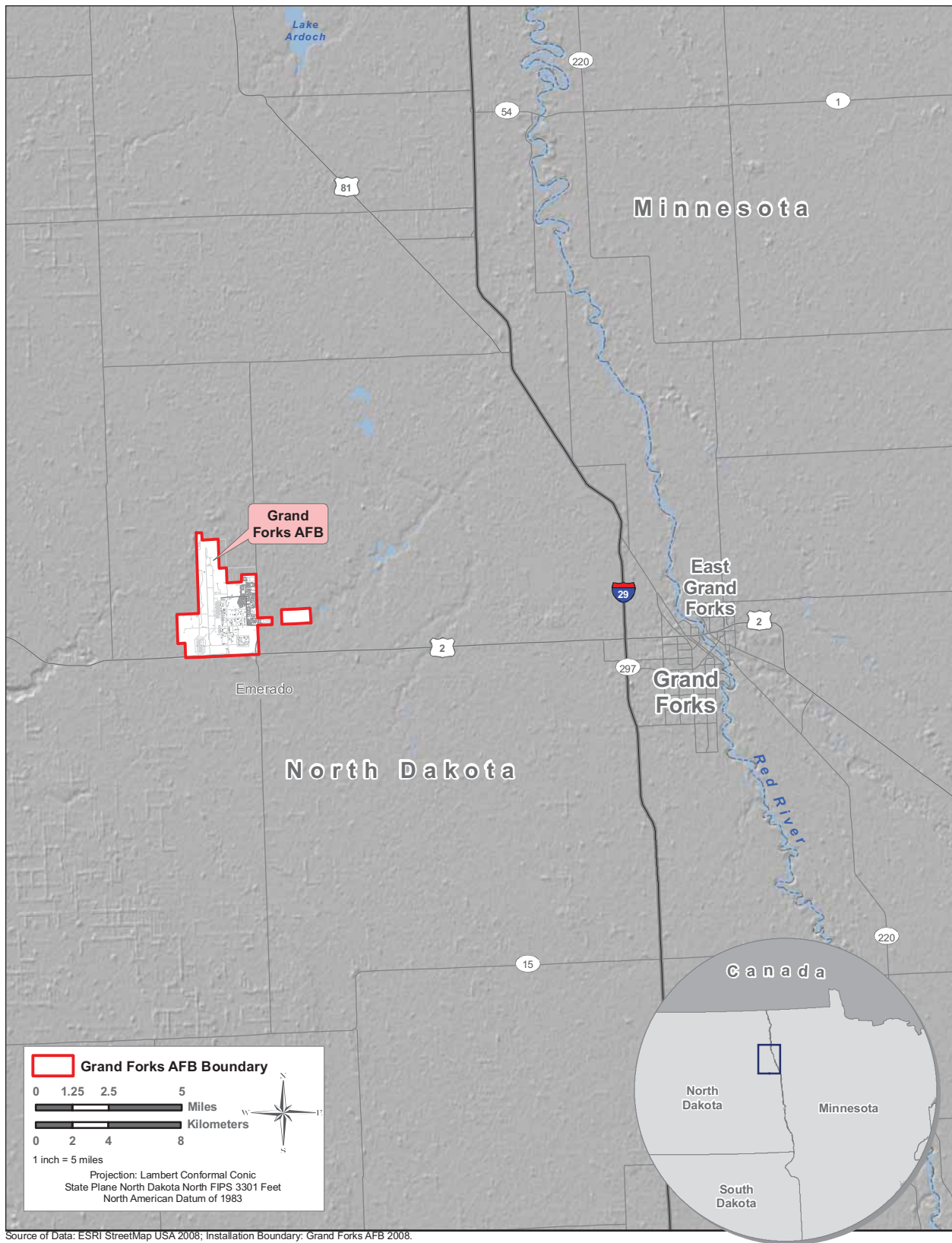


Figure 1-1. Grand Forks AFB and Surrounding Area

1.2 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to complete necessary construction, demolition, and infrastructure improvements to ensure that future mission and facility requirements are met. The collective analysis of all appropriate projects in a single EA will streamline the NEPA review process; eliminate project fractionation and segmentation; facilitate coordination of land use planning; expedite project execution by using early planning; reduce installation, reviewing agency, and major command workloads; provide cost savings; help better evaluate potential cumulative environmental impacts; assist in maintaining a baseline for future analysis; support strategic basing decision making; encourage agency coordination; and meet the USAF's EIAP goals.

The need for the Proposed Action is to meet current and future mission requirements and national security objectives associated with Grand Forks AFB. This involves meeting ongoing mission requirements that necessitate repairing and upgrading installation utilities, pavements, and facilities; improving the efficiency and effectiveness of forces with the capability to expand; replacing older, substandard facilities with new buildings that are on a par with workplaces outside the gate; and providing reliable utilities, quality housing, and an efficient transportation system to support Grand Forks AFB. In addition, morale and welfare projects that are a critical part of supporting the Grand Forks AFB mission are included. Continued development of infrastructure at Grand Forks AFB must take into account future facility construction, demolition, renovation, transportation needs, airfield alterations and enhancements, systems improvements, utilities improvements, land use planning, and development constraints and opportunities. Contributions by Grand Forks AFB to national security, and prospects for the assignment of additional missions in the future, dictate that the installation implement planning for the next 5 years. To ensure complete readiness at the installation for any tasks assigned, infrastructure projects must take into account—and be capable of supporting—all functions inherent to a USAF installation. These include aircraft operations and maintenance activities, security, administration, communications, billeting, supply and storage, training, transportation, and community quality of life.

1.3 Scope of the Analysis

Grand Forks AFB seeks to improve the continuing installation development process by evaluating in a single EA all actions proposed in the 319 ARW-approved community of plans for installation development. A compilation of all projects from the 319 ARW-approved community of plans addressed in this IDEA is presented in **Section 2**. Some of the projects identified in the Grand Forks AFB community of installation development plans are appropriate for the application of Categorical Exclusions and therefore are not analyzed in the IDEA. Additionally, some projects are analyzed in separate NEPA documents, and therefore, will not be included in the IDEA. The scope of the IDEA includes an evaluation of alternatives for the various projects and an analysis of the cumulative effects on the natural and man-made environments. The Proposed Action includes numerous projects, such as demolition of aging facilities, new facility construction, facility upgrades, facility repair and renovation, utilities upgrades, community living upgrades, infrastructure upgrades, and recreational upgrades that would be completed or implemented during the next 5 years. The assessment compiles information on constraints that might inhibit development or dictate courses of actions affecting development, improve the facility planning process, and capture the Wing Commander's vision of what facility and infrastructure improvements are necessary to support the installation's ongoing mission.

The IDEA evaluates the impacts of the Proposed Action, which encompasses the continuing activities of demolition, construction, and infrastructure improvements inherent to Grand Forks AFB adapting to ever-evolving mission requirements. The IDEA documents and evaluates the effects of all currently identified activities involved in modernizing and upgrading Grand Forks AFB to meet future

requirements. The IDEA presents and analyzes potentially adverse direct, indirect, and cumulative environmental impacts resulting from implementation of Grand Forks AFB's installation development (the Proposed Action) with emphasis on avoiding impacts on environmentally sensitive areas.

The scope of the IDEA includes an evaluation of the Proposed Action and alternatives, including the No Action Alternative. None of the projects contained in the IDEA, as part of the Proposed Action, would be sited in floodplains, threatened or endangered species habitat, or known archaeological sites. Projects that impact these resource areas or other sensitive environmental or socioeconomic resources would be the subject of separate NEPA analyses. However, some projects would have minimal direct impacts on wetland areas and there is potential for indirect impacts on wetland areas from development and excavation in areas adjacent to these wetland areas. Wetland impacts would be reduced to the maximum extent practicable through project design and implementation of environmental protection measures. All projects directly or indirectly impacting wetland areas require a Finding of No Practicable Alternative (FONPA) and approval from HQ AMC. In addition, appropriate permits must be obtained from applicable regulatory agencies to address impacts on wetland areas and to determine potential mitigation if required. All projects having moderate to major direct or indirect wetland impacts would be subject to separate NEPA analysis.

The presentation of the Proposed Action, as described in **Section 2**, uses three broad categories to define the numerous projects identified in the Grand Forks community of installation development plans (i.e., demolition, construction, and infrastructure). These three categories were identified for use in this document because they allow the grouping of development initiatives by generally common elements of their activity and the nature of their potential environmental impacts. Within each of the three categories, the IDEA analyzes the environmental impacts in detail as follows:

- Establishing a subset of representative projects for each of the three categories
- Analyzing in detail the environmental impacts resulting from the activities of the selected representative subset of projects within each category
- Establishing a range of potential impacts that can be expected from the selected representative projects within each category.

These categories and the representative projects for each category are described in **Sections 2.1.2, 2.1.3, and 2.1.4**. Representative projects were selected based on size, acreage disturbed, amount of air emissions, increases in impervious surfaces, vegetation disturbed, and other relevant factors associated with environmental and socioeconomic resources. Other projects conducted over the next 5 FYs (FY 2010 to FY 2014) are unlikely to be larger in scope or have greater environmental impacts than representative projects chosen. The IDEA also analyzes the siting of construction activities based on environmental constraints. All other projects listed in **Section 2** were analyzed using the same methodology as applied to the representative projects and their impacts are summarized in tabular form. The categorized lists and a map showing locations for the proposed projects that compose the Proposed Action can be found in **Section 2**.

1.4 Summary of Key Environmental Compliance Requirements

1.4.1 National Environmental Policy Act

NEPA (42 United States Code [U.S.C.] Section 4321–4347) is a Federal statute requiring the identification and analysis of potential environmental impacts associated with proposed Federal actions before those actions are taken. The intent of NEPA is to help decision makers make well-informed

decisions based on an understanding of the potential environmental consequences and take actions to protect, restore, or enhance the environment. NEPA established the Council on Environmental Quality (CEQ) that was charged with the development of implementing regulations and ensuring Federal agency compliance with NEPA. The CEQ regulations mandate that all Federal agencies use a prescribed structured approach to environmental impact analysis. This approach also requires Federal agencies to use an interdisciplinary and systematic approach in their decision making process. This process evaluates potential environmental consequences associated with a proposed action and considers alternative courses of action.

The process for implementing NEPA is codified in Title 40 of the Code of Federal Regulations (CFR), Parts 1500–1508, *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*. The CEQ was established under NEPA to implement and oversee Federal policy in this process. The CEQ regulations specify that an EA be prepared to briefly provide evidence and analysis for determining whether to prepare a Finding of No Significant Impact (FONSI)/FONPA, where a FONPA is appropriate (see **Section 1.4.2**), or whether the preparation of an Environmental Impact Statement (EIS) is necessary. The EA can aid in an agency's compliance with NEPA when an EIS is unnecessary and facilitate preparation of an EIS when one is required.

Air Force Policy Directive (AFPD) 32-70, *Environmental Quality*, states that the USAF will comply with applicable Federal, state, and local environmental laws and regulations, including NEPA. The USAF's implementing regulation for NEPA is *Environmental Impact Analysis Process*, 32 CFR Part 989, as amended.

1.4.2 Integration of Other Environmental Statutes and Regulations

To comply with NEPA, the planning and decision making process for actions proposed by Federal agencies involves a study of other relevant environmental statutes and regulations. The NEPA process, however, does not replace procedural or substantive requirements of other environmental statutes and regulations. It addresses them collectively in the form of an EA or EIS, which enables the decision maker to have a comprehensive view of major environmental issues and requirements associated with the Proposed Action. According to CEQ regulations, the requirements of NEPA must be integrated “with other planning and environmental review procedures required by law or by agency so that all such procedures run concurrently rather than consecutively.”

The IDEA examines potential effects of the Proposed Action and alternatives on 11 resource areas: noise, land use, air quality, safety, geological resources, water resources, biological resources, cultural resources, socioeconomic resources and environmental justice, infrastructure, and hazardous materials and wastes. These resources were identified as being potentially affected by the Proposed Action and include applicable elements of the human environment that are prompted for review by Executive Order (EO), regulation, or policy.

EO 11990, *Protection of Wetlands*, (May 24, 1977) directs agencies to consider alternatives to avoid adverse effects and incompatible development in wetlands. Federal agencies are to avoid new construction in wetlands, unless the agency finds there is no practicable alternative to construction in the wetland and the proposed construction incorporates all possible measures to limit harm to the wetland. Agencies should use economic and environmental data, agency mission statements, and any other pertinent information when deciding whether or not to build in wetlands. EO 11990 directs each agency to provide for early public review of plans for construction in wetlands. In accordance with EO 11990 and 32 CFR Part 989, a FONPA must accompany the FONSI stating why there are no practicable alternatives to development within or affecting wetland areas.

EO 13514, *Federal Leadership In Environmental, Energy, And Economic Performance* (October 5, 2009) directs Federal agencies to improve water use efficiency and management; implement high performance sustainable Federal building design, construction, operation, and management; and advance regional and local integrated planning by identifying and analyzing impacts from energy usage and alternative energy sources. EO 13514 also directs Federal agencies to prepare and implement a Strategic Sustainability Performance Plan to manage its greenhouse gas emissions, water use, pollution prevention, regional development and transportation planning, and sustainable building design; and promote sustainability in its acquisition of goods and services. Section 2(g) requires new construction, major renovation, or repair and alteration of buildings to comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings*. The CEQ regulations at 40 CFR 1502.16(e) direct agencies to consider the energy requirements and conservation potential of various alternatives and mitigation measures.

EO 13175, *Consultation and Coordination with Indian Tribal Governments* (November 6, 2000) directs Federal agencies to coordinate and consult with Indian tribal governments whose interests might be directly and substantially affected by activities on federally administered lands.

Appendix A contains examples of relevant laws, regulations, and other requirements that are often considered as part of the analysis. Where useful to better understanding, key provisions of the statutes and EOs described in **Appendix A** will be discussed in more detail in the text of the IDEA.

1.4.3 Interagency Coordination and Public Involvement

NEPA requirements help ensure that environmental information is made available to the public during the decision making process and prior to actions being taken. The premise of NEPA is that the quality of Federal decisions will be enhanced if proponents provide information to the public and involve the public in the planning process. The Intergovernmental Coordination Act and EO 12372, *Intergovernmental Review of Federal Programs*, require Federal agencies to cooperate with and consider state and local views in implementing a Federal proposal. Air Force Instruction (AFI) 32-7060, *Interagency and Intergovernmental Coordination for Environmental Planning* (IICEP), requires the USAF to implement the IICEP process, which is used for the purpose of agency coordination and implements scoping requirements.

Through the IICEP process, Grand Forks AFB notifies relevant Federal, state, and local agencies of the Proposed Action and provides them sufficient time to make known their environmental concerns specific to the action. The IICEP process also provides Grand Forks AFB the opportunity to cooperate with and consider state and local views in implementing the Federal proposal. All IICEP material related to this EA are included in **Appendix B** and will be expanded throughout the EIAP process.

A Notice of Availability (NOA) was published in the *Grand Forks Herald* and the Draft EA is to be made available to the public for a 30-day review period. Public and agency comments on the Draft EA will be considered prior to a decision being made as to whether or not to sign a FONSI/FONPA.

1.5 Organization of this Document

This EA is organized into 9 sections. **Section 1** provides the purpose of and need for the Proposed Action. **Section 2** contains a description of the Proposed Action, alternatives to the Proposed Action, and the No Action Alternative. **Section 3** contains a general description of the physical resources and baseline conditions that could potentially be affected by the Proposed Action, the alternatives to the Proposed Action, and the No Action Alternative. **Section 4** presents an analysis of the potential environmental consequences associated with the implementation of the Proposed Action, alternatives to

the Proposed Action, and the No Action Alternative. **Section 5** includes an analysis of the potential cumulative effects. **Section 6** lists the preparers of the document. **Section 7** lists the references used in the preparation of the document.

Appendix A contains applicable laws, regulations, policies, and planning criteria potentially relevant to NEPA analysis. **Appendix B** includes all IICEP materials. **Appendix C** includes air quality emissions calculations. **Appendix D** includes a list of documented breeding birds at Grand Forks AFB. **Appendix E** includes a list of all facilities on Grand Forks AFB that have reached or are reaching 50 years in age by 2014. **Appendix F** contains documentation on NRHP Eligibility Evaluations, State Historic Preservation Office (SHPO) Concurrence, and Advisory Council on Historic Preservation (ACHP) Program Comments (PC). **Appendix G** contains environmental protection measures and best management requirements for wetlands and other waters of the United States.

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2. Description of the Proposed Action and Alternatives

This section presents information on the Proposed Action related to the implementation of installation development, as described in the 319 ARW-approved General Plan and other relevant installation development plans. **Section 2.1** describes the Proposed Action at Grand Forks AFB. **Section 2.2** identifies alternatives to the Proposed Action, including the No Action Alternative. **Section 2.3** identifies the decision to be made and the Preferred Alternative.

2.1 Proposed Action

The Proposed Action is to implement continuing installation development actions as found in the community of existing 319 ARW-approved development plans for Grand Forks AFB. The Proposed Action consists of numerous projects related to installation development. It is intended that the projects contained in this IDEA will be reviewed during a 5-year rotational basis and this document might be updated to accommodate changes. If during the course of the next 5 years any of the projects listed in **Tables 2-1, 2-2, and 2-3** change enough to be outside the coverage of the analysis provided in this IDEA, the specified project would be excluded from the NEPA analysis represented by this IDEA without affecting other projects originally included in the IDEA. The IDEA does not contain construction and infrastructure projects associated with the beddown of remotely piloted aircraft (RPA) at Grand Forks AFB. These projects are currently being evaluated in a separate EIS.

The IDEA has been prepared using a constraints-based analysis (see **Section 2.1.1**). This approach enables a comprehensive evaluation of environmental concerns throughout the installation and also those concerns unique to specific areas of Grand Forks AFB. This analysis uses the information obtained from extensive recent EIAP evaluations for similar types of projects to determine the direct, indirect, and cumulative effects of projects that would be completed as part of the installation's development plan.

The projects analyzed in this IDEA are categorized as demolition, construction, or infrastructure projects. For the purposes of describing the specific types of projects included as the Proposed Action, representative projects from each of the categories are listed in **Sections 2.1.2, 2.1.3, and 2.1.4**. These representative projects provide examples of the various types of projects within each category; however, the total suite of projects that make up the Proposed Action are briefly described in **Tables 2-1, 2-2, and 2-3**. The total potential impacts associated with implementation of each of the projects in **Tables 2-1, 2-2, and 2-3** are evaluated in the IDEA.

Tables 2-1, 2-2, and 2-3 contain project information and **Figures 2-1 and 2-2** provide maps showing the proposed locations of all projects associated with the Proposed Action. **Tables 2-1 through 2-3** contain project information for each demolition, construction, and infrastructure project, including project description, project area, and change in impervious surface. All project locations as they were known at the time of this EA publication, and associated environmental constraints, are depicted in **Figure 2-1**. Each project has been assigned a Project Identification Number, which is identified in **Tables 2-1 through 2-3** and used in the presentation of the information displayed on **Figures 2-1 and 2-2**.

Table 2-1. Proposed Facilities Demolition Projects

Installation Project Number	Project Identification Number and Title	FY	Land Use	Description	Project Area (ft ²)	Change in Impervious Surface (ft ²)
Representative Demolition Projects						
JFSD200938	D1. Demolish MSA Revised Plan	2013	Industrial	Demo Buildings 712, 717, 719, 723, 724, 725, 726, 727, 729, 737, and 738, based on AFCEE Team visit.	135,643	-135,643
JFSD200113	D2. Demolish Buildings 304 and 515 in support of Consolidated Security Forces	2010	Industrial	Demolish Buildings 304 and 515.	22,631	-22,631
JFSD200964 / JFSD200992 / JFSD981016	D3. Demolish Hangars 520, 521, 522, and 523.	2012 and 2014	Airfield	Demolish Hangars 520, 521, 522, and 523.	117,359	-117,359
Other Demolition Projects						
JFSD200808P6	D4. Demolish Family Housing Phase 6 (20 Units)	2010	Housing (family)	Demolish substandard duplex units 1715, 1719, 1725, 1729, 1731, 1739, 1741, 1743, 1745, and 1747.	28,647	-28,647
JFSD200281	D5. Demolish DRMO Facilities (430, 432, 437, 442)	2013	Industrial	Demolish substandard DRMO facilities 430, 432, 437, and 442.	10,471	-10,471
JFSD200503	D6. Demolish Bunch and Gray Hall Dormitories	2012	Housing (unaccompanied)	Demolish Buildings 221 and 222.	52,530	-52,530
JFSD979905	D7. Demolish Building 663, Engine Test Cell Concrete Foundation	2013	Industrial	Demolish substandard concrete no longer needed.	4,248	-4,248
JFSD201007	D8. Demolish Freedom Hall Dormitory	2012	Housing (unaccompanied)	Demolish Building 219.	25,347	-25,347
Total Square Feet					396,876	-396,876

Key:

DRMO = Defense Reutilization and Marketing Office

ft² = square foot

MSA = Munitions Storage Area

Table 2-2. Proposed Facilities Construction Projects

Installation Project Number	Project Identification Number and Title	FY	Land Use	Description	Project Area (ft ²)	Change in Impervious Surface (ft ²)
Representative Construction Projects						
JFSD200113	C1. Construct Consolidated Security Forces	2010	Industrial	Construct consolidated SFS to replace multiple, scattered facilities 304 and 515.	369,654	+111,858
JFSD200992	C2. Construct BCE Pavements and Maintenance Facility/Snow Barn	2012	Airfield Ops	Construct new snow barn to replace Building 522.	211,843	+131,114
JFSD200910	C3. Construct Indoor Small Arms Range	2014	Training	Construct indoor range to replace substandard Building 654.	63,712	+52,948
Other Construction Projects						
JFSD200559	C4. Youth Center	2010	Community	Construct new Youth Center to replace substandard, undersized Building 121.	20,473	+20,473
JFSD200905	C5. Construct Dog Park MFH	2010	Community	Construct chain-link fenced one-acre dog exercise park between FAMCAMP and MFH area.	43,560	No change
JFSD200985	C6. Construct Multi-Use Trail Along Eielson Street	2009	Community and Industrial	Extend multi-use trail to permit people-friendly access to all facilities along Eielson Street.	97,002	+97,002
JFSD200440	C7. Construct Base Dumpster Screens	2011	Multiple	Install a concrete slab with enclosure fencing adjacent to existing trash dumpster.	800	+800
JFSD200938	C8. Construct Integrated Munitions Maintenance Facility	2012	Industrial	Construct two new MSA Maintenance facilities to replace substandard Building 737.	7,000	+7,000

Installation Project Number	Project Identification Number and Title	FY	Land Use	Description	Project Area (ft ²)	Change in Impervious Surface (ft ²)
Other Construction Projects (continued)						
JFSD200270	C9. Add To Refueler Maintenance Building 303	2013	Industrial	Add approximately 210 ft ² to southwest corner of Building 303 for showers, lockers, and washer/dryer. Demolish entry; bury electric line.	210	+210
JFSD200958	C10. Construct CDC Dumpster Screen	2012	Community	Construct new dumpster screen at the Child Development Center.	100	No change
JFSD960142 and JFSD990073	C11. Construct Base Engineer Admin/Shops/Contracting - Phases 1 and 2	2014	Industrial	Construct consolidated CES to replace substandard Building 418 -Phase 1. Construct consolidated CES to replace multiple scattered facilities 318, 411, 412, and 540. Phase 2.	638,171	+406,747
JFSD981016	C12. Central Deployment Center	2014	Aircraft Ops	Construct Central Deployment Center to replace substandard Building 523.	329,095	+167,637
Total Square Feet					1,781,620	+995,789

Key:

AFCEE = Air Force Center for Engineering and the Environment

BCE = Base Civil Engineering

CDC = Child Development Center

CES = Civil Engineering Squadron

FAMCAMP = Family Camping Area

ft² = square foot

MFH = Military Family Housing

MSA = Munitions Storage Area

SFS = Security Forces Squadron

Table 2-3. Proposed Infrastructure Projects

Installation Project Number	Project Identification Number and Title	FY	Land Use	Description	Project Area (ft ²)	Change in Impervious Surface (ft ²)
Representative Infrastructure Projects						
JFSD200250	11. Construct Access Road/Parking at Buildings 314 and 242	2012	Industrial	Construct a road between Buildings 242 and 314 to align three primary communications facilities located in Buildings 102, 242, and 314.	114,300	+114,300
JFSD200907	12. Repair HVAC – Ground Source Heat Pump – CATM – Building 652	2010	Training	Remove existing HVAC systems at the CATM as required. Install ground source heat pumps, air handlers, controls, and electrical power circuits as required. Remove existing propane tank and piping. Provide all site support as required for ground source piping network/system.	11,710	No change
JFSD200705	13. Repair Runway-Mill and Overlay (S/R)	2013	Airfield	Repair runway with mill and overlay.	1,852,497	No change
Other Infrastructure Projects						
JFSD200636A	14. Construct Curbs-Parking Lot TLF (143)	2012	Community	Construct curbs on the parking lot to the south of the TLF, Building 143.	900	+900
JFSD949951B	15. Repair CS Admin Parking Lot (S/R)	2012	Industrial	Repair the CS administration parking lot.	105,750	No change

Installation Project Number	Project Identification Number and Title	FY	Land Use	Description	Project Area (ft ²)	Change in Impervious Surface (ft ²)
Other Infrastructure Projects (continued)						
JFSD200909	16. Energy Conservation: Repair HVAC-GSHP-CS	2011	Administrative	Remove existing HVAC systems in the Communications Squadron. Install ground source heat pumps for Communications Squadron. Remove and replace ductwork as required. Replace drop ceilings in affected areas. Excludes mechanical rooms, hallways, and drive-through bays. All site support as required for ground source piping network/system.	15,000	No change
JSFD200908	17. Repair HVAC – Ground Source Heat Pump – Recycling Facility	2011	Industrial	Remove existing high energy electric heaters and HVAC systems at the Recycling Facility (Building 671). Install ground source heat pumps and associated infrastructure. Provide all site support as required for ground source piping network/system.	200	No change
Total Square Feet					2,100,357	+115,200

Key:

CATM = Combat Arms Training and Maintenance

CS = Communication Squadron

ft² = square foot

GSHP = ground source heat pumps

HVAC = Heating, Ventilation, and Air Conditioning

S/R = Sustainment/restoration

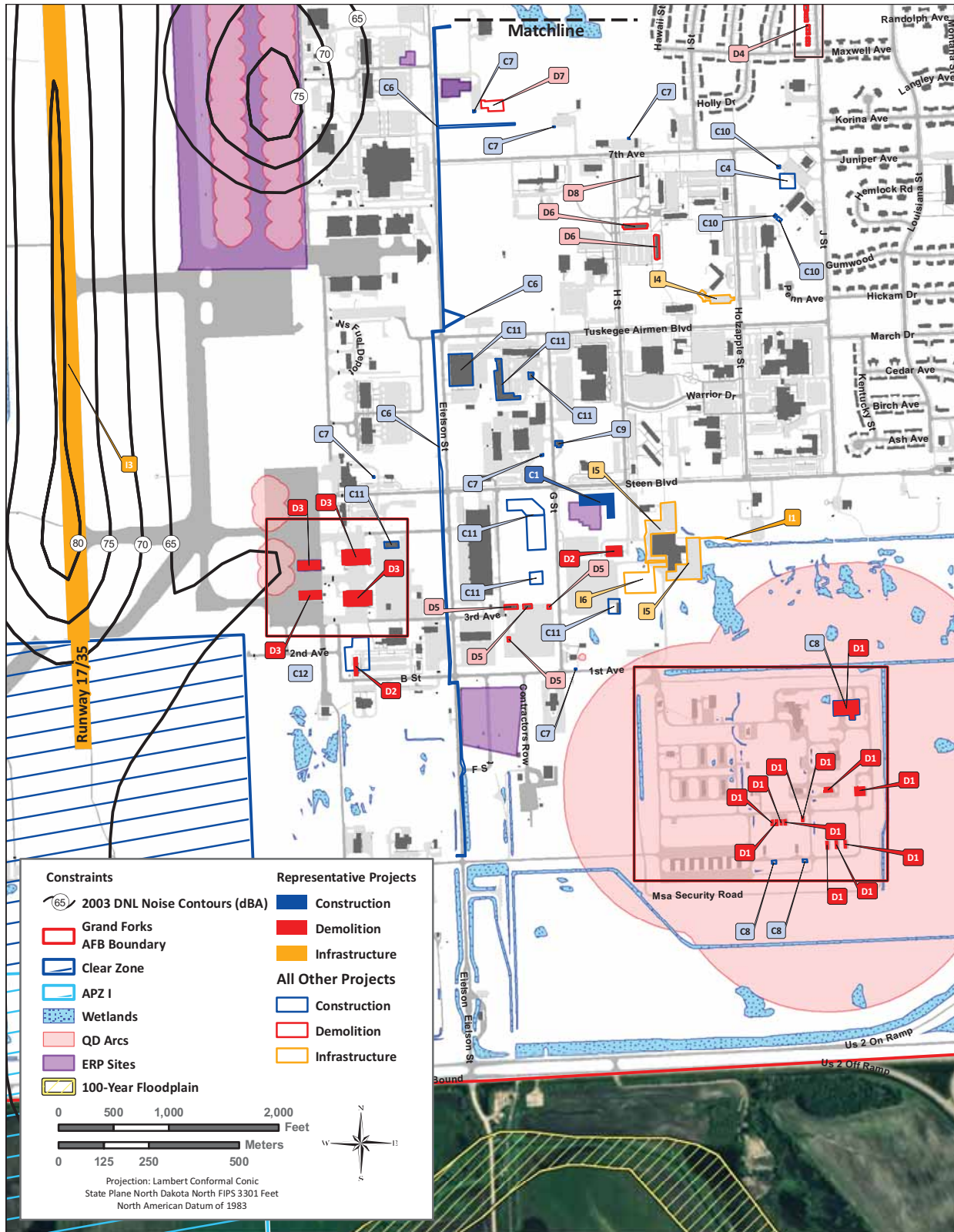
TLF = temporary lodging facility



Sources: Base Data 2008; Representative Projects: Grand Forks AFB 2010; Aerial Photo: ArcGIS Microsoft Virtual Earth Premium Online Service, 2009.

Note: Project numbers and associated descriptions are shown in Table 2-1 through 2-3.

Figure 2-1. Locations and Environmental Constraints of All Projects Associated with the Proposed Action (North)



Sources: Base Data 2008; Representative Projects: Grand Forks AFB 2010; Aerial Photo: ArcGIS Microsoft Virtual Earth Premium Online Service, 2009.

Note: Project numbers and associated descriptions are shown in Table 2-1 through 2-3.

Figure 2-2. Locations and Environmental Constraints of All Projects Associated with the Proposed Action (South)

Each project would be sited in a manner compatible with Grand Forks AFB's surrounding land uses (see **Figure 2-3**), as defined in the General Plan (USAF 2006), and would avoid sensitive or constrained areas (see **Figure 2-4**) to the maximum extent practicable. Sensitive areas include wetlands, Environmental Restoration Program (ERP) sites, floodplains, state-listed and species of special concern migration and breeding habitat areas, and known archaeological sites. Constrained areas include airfield and airspace clear zones (CZs) and accident potential zones (APZs), areas within safety quantity-distance (QD) arcs, areas inside the 65 A-weighted decibels (dBA) noise contour, and areas restricted per AT/FP and other mission requirements.

The Grand Forks AFB General Plan identifies 11 land use categories (excluding water as a land category): administrative, airfield, airfield pavements, aircraft operations and maintenance, community, housing accompanied, housing unaccompanied, industrial, medical, outdoor recreation, and open space. **Figure 2-3** shows the land uses that have been defined at Grand Forks AFB.

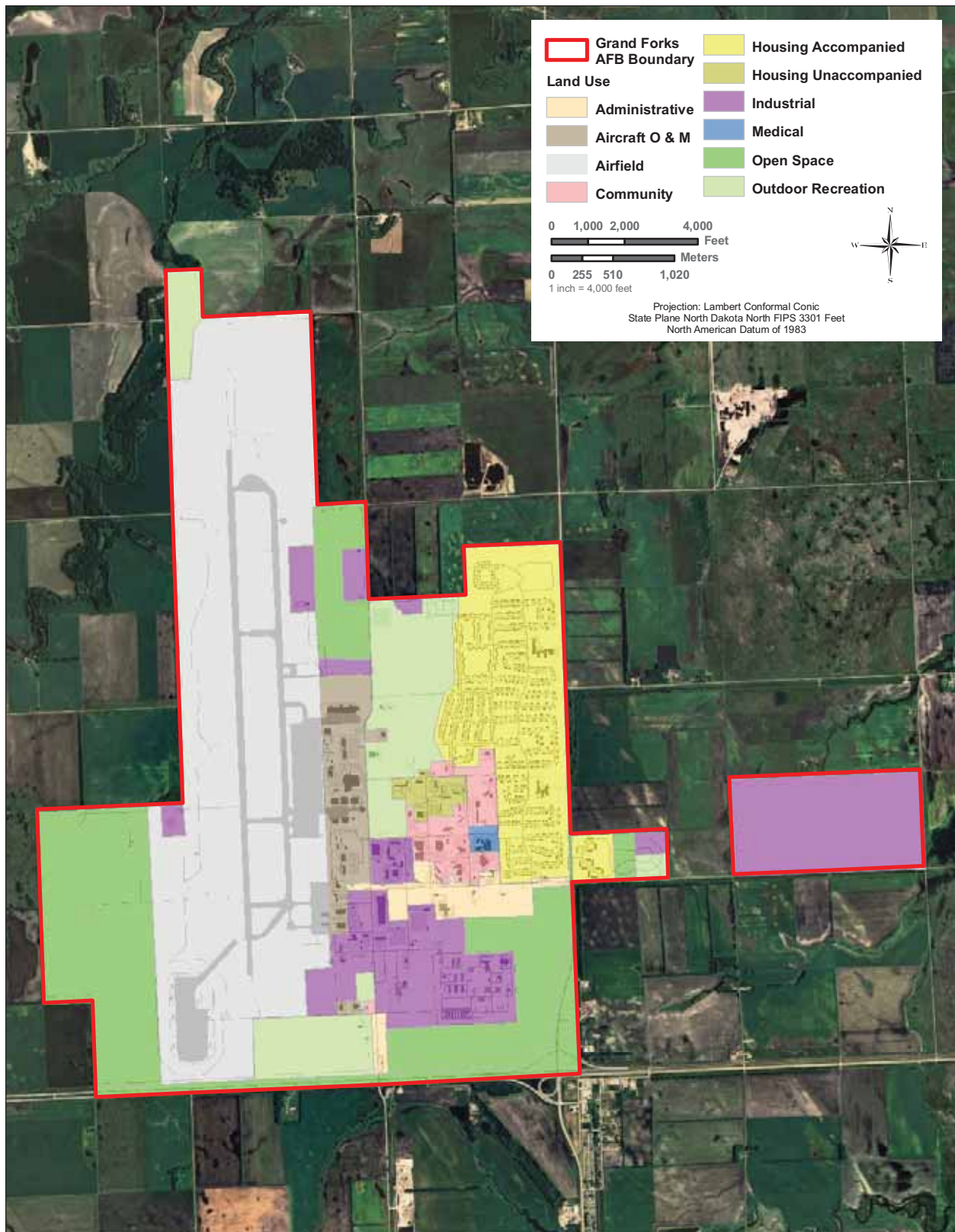
The exterior and interior design of new facilities would follow the design guidelines outlined in the *Air Mobility Command Civil Engineering Squadron Design Guide* and the *Grand Forks AFB Architectural Guide and Landscape Compatibility Guide*. This guidance would ensure a consistent and coherent architectural character throughout Grand Forks AFB.

Landscaping would be used to provide an attractive and professional-looking installation by using plants, shrubs, and trees to blend with the surrounding environment. Landscape design and maintenance activities would comply with the land management goals specified in the Integrated Natural Resources Management Plan (INRMP) (GFAFB 2005). Landscape design would use regionally native plants for improved and semi-improved grounds. Landscape designs would not use nonnative species and would minimize adverse effects on natural habitats while reducing maintenance inputs in terms of energy, water, manpower, and equipment. In addition, the landscape designs would choose plant species adapted to local environmental conditions that have potential to reduce the need for irrigation and fertilization or pesticide use.

Force protection measures would be incorporated in accordance with the *USAF Installation Force Protection Guide*. All construction would comply with applicable building, fire, and safety codes. The proposed construction projects would be implemented using sustainable design concepts. Sustainable design concepts emphasize state-of-the-art strategies for site development, efficient water and energy use, and improved indoor environmental quality.

All projects identified as part of the Proposed Action in the IDEA would avoid sensitive areas to the greatest extent possible. Proposed locations of each representative project in relation to environmental constraints are shown in **Figure 2-4**. The precise layout and design of these projects are in the early planning stages and, therefore, exact locations and layouts are not finalized. Should locations and final layouts of the projects differ substantially from those anticipated (e.g., in location, layout, or potential environmental consequences), additional environmental analysis would be completed. If it is determined that future projects outside the scope of the IDEA would impact sensitive resources, then separate environmental analysis on those projects would be required.

All construction, demolition, and infrastructure projects included in **Tables 2-1, 2-2, and 2-3** and those that might be added in the upcoming years meeting the scope and requirements of this IDEA are required to follow USAF EIAP requirements. Project proponent's are required to coordinate with 319th Civil Engineering Squadron/Asset Management (319 CES/CEA) throughout the projects lifecycle. Once this coordination occurs, 319 CES/CEA will determine if the project is qualified for Categorical Exclusion (CATEX) through its inclusion in the analysis associated with this IDEA or whether it requires separate environmental analysis. In addition, if a project addressed under this IDEA is changed significantly in scope or in a manner such that it would impact sensitive resources, additional environmental analysis would be required.



Source of Installation Boundary, Land Use: Grand Forks AFB 2008; Imagery courtesy of ArcGIS Online Virtual Earth Maps Premium 2009.

Figure 2-3. Grand Forks AFB Existing Land Use Categories

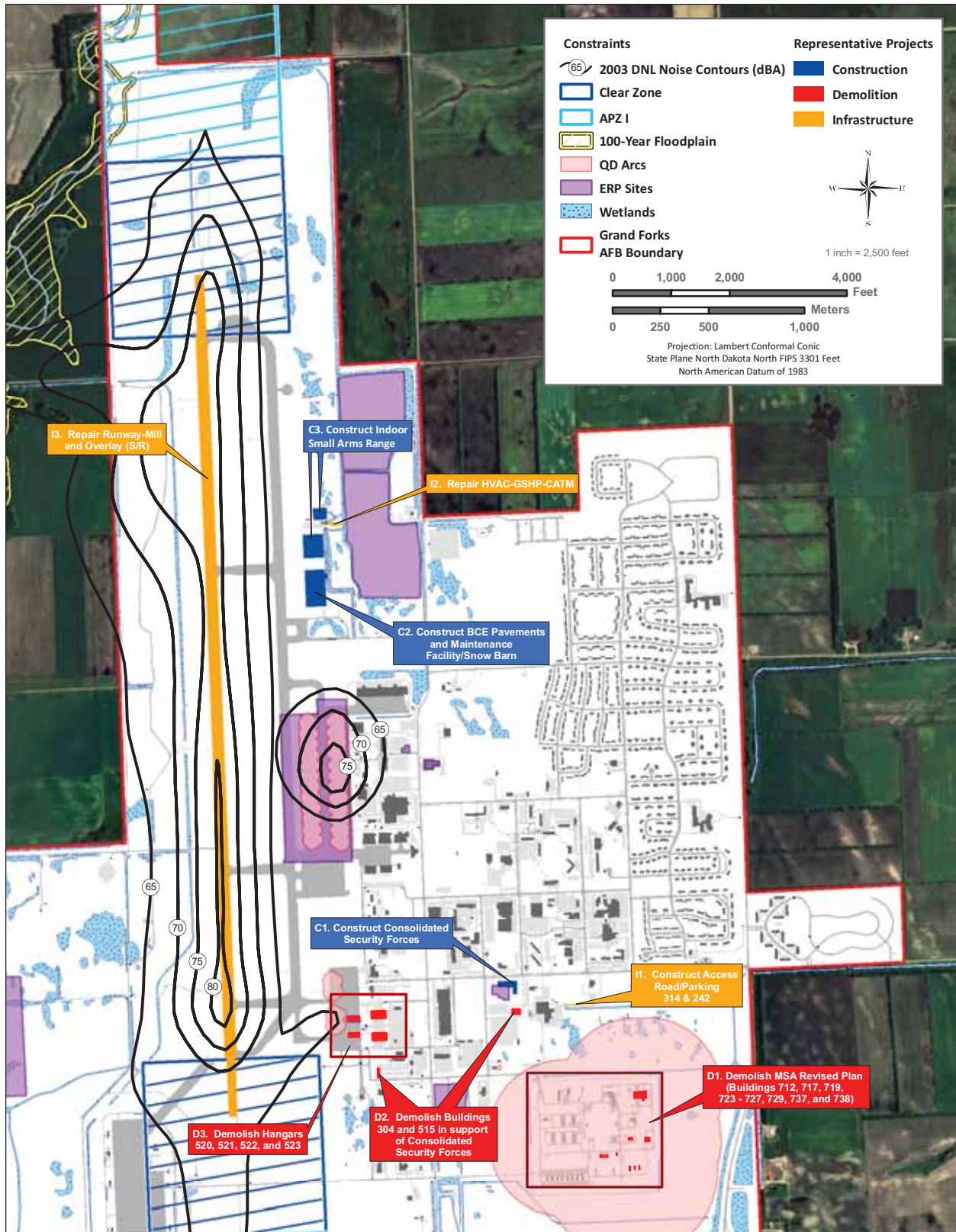


Figure 2-4. Representative Projects Related to Known Constraints at Grand Forks AFB

2.1.1 Major Installation Constraints

There are a number of land use, regulatory, and mission-related constraints within the boundaries of Grand Forks AFB that will influence and could limit future development at the installation. The major constraints on Grand Forks AFB are depicted in **Figure 2-2** and are discussed in the following bulleted paragraphs. The electronic mapping data from Grand Forks AFB's Geographical Information System (GIS) database (also called the GeoBase system) were used to quantify the major installation constraints to development, unless another source of information is identified. Some constraint areas overlap and therefore the acreages listed in the following bulleted items do not equal the total acreage of Grand Forks AFB. The acreage calculations do not include the portions of the constraint areas that extend off the installation.

- **Noise Zones (1,034 acres).** Aircraft operations are a dominant component of the noise environment at Grand Forks AFB. USAF, Federal Aviation Administration (FAA), and the U.S. Department of Housing and Urban Development criteria specify that noise levels in noise-sensitive land use areas are normally considered unacceptable where they exceed a day-night average A-weighted sound level (DNL) of 65 dBA. Grand Forks AFB restricts development to compatible uses when noise levels exceed a DNL of 65 dBA.
- **Airfield Infrastructure, Clear Zones, and Imaginary Surfaces (913 acres).** The airfield includes pavement, runways, overrun, apron and ramp, and arm/disarm pads. CZs, APZs, and imaginary surfaces are areas where nonairfield development is constrained or discouraged for airfield safety. These areas would allow only airfield improvements and projects directly associated with airfield operations. All projects within this area must be approved by the Community Planner, members of the Project Siting Review Panel, Facilities Utilization Board (FUB), and airfield management prior to commencing any construction-related activities.
- **Munitions and Other Safety Criteria (469 acres).** There are several areas that are constrained for safety reasons at Grand Forks AFB. The QD arcs are the minimum prescribed distance between munitions site handling and storage areas and inhabited areas. QD arcs on Grand Forks AFB are mostly located in the southeastern portion of the installation and the northeastern side of the airfield. These QD arcs are generated from the munitions storage area and the hazardous cargo parking pad. Areas around radiating antennas at Grand Forks AFB have associated electromagnetic field safety zones.
- **Environmental Restoration Program Sites (324 acres).** Grand Forks AFB has seven onsite ERP sites (USAF 2008a). New facilities might be constructed within certain ERP sites depending upon the level of contamination, clean-up efforts, and land use controls. Approval of new construction within ERP sites must be obtained from the FUB and coordinated with the 319 CES/CEA. In addition, there is a land treatment facility in the southwestern portion of the installation.
- **Wetlands (305 acres).** It is USAF policy to avoid constructing new facilities within areas containing wetlands, where practicable. Grand Forks AFB has approximately 300 wetlands covering 305 acres (GFAFB 2005). Wetland impacts would be reduced to the maximum extent practicable through project design and implementation of environmental protection measures. However, some projects would have minimal direct impacts on wetland areas and there is potential for indirect impacts on wetland areas from development and excavation in areas adjacent to these wetland areas. In accordance with EO 11990, a FONPA must be prepared and approved by HQ AMC for all projects impacting wetland areas. In addition,

appropriate permits must be obtained from applicable regulatory agencies to address impacts on wetland areas and to determine potential mitigation, if required.

- **100-Year Floodplain (18 acres).** It is USAF policy to avoid constructing new facilities within the 100-year floodplain in order to protect the functions of floodplains, minimize the potential damage to facilities, and ensure the safety of working personnel. Should construction within the 100-year floodplain be considered, a FONPA must be obtained and the project must be approved by HQ AMC. None of the projects analyzed in the IDEA would occur in the floodplain.
- **Threatened and Endangered Species and Associated Habitats.** No Federal-listed threatened or endangered species are known to exist on Grand Forks AFB (GFAFB 2005). However, the installation does support occasional use by state-listed threatened and endangered species and state species of special concern. Most of these are migratory bird species that use a variety of habitats on Grand Forks AFB such as grasslands and wetland areas. There is no critical or significant habitat present on Grand Forks AFB. Construction activities that could affect state-listed threatened or endangered species or state species of special concern must be coordinated with the North Dakota Game and Fish Department and 319 CES/CEA to determine feasible conservation measures. In addition, if a federally protected species were to be affected, a Biological Assessment would be prepared and submitted to the U.S. Fish and Wildlife Service (USFWS); the USFWS would then prepare a Biological Opinion on the effects of the project proposal on federally protected species, as required under Section 7 of the Endangered Species Act (ESA) of 1973. Concurrence on the project must be obtained prior to commencing construction activities that could affect a state-listed or state species of special concern.
- **Cultural Resources, Historic Buildings, and Archaeological Sites.** There are several buildings eligible or potentially eligible National Register of Historic Places (NRHP) on Grand Forks AFB, and no NRHP eligible archaeological sites on the installation. Building 714, located in the fenced munitions storage area at the southeast corner of the installation, is eligible for the NRHP. It was constructed in 1958-59 for the Minuteman I, Project Big Star and subsequently modified for the first targetable multiple warhead Intercontinental Ballistic Missile (the Minuteman III). Building 313 was constructed in 1965 to serve as a Missile Training Facility. Consultation is in progress between Grand Forks AFB and the North Dakota SHPO on the NRHP eligibility of Building 313. There are six Cold War-era munitions storage igloos (Buildings 703, 704, 705, 706, and 707) for which management is applicable under the 2006 PC for management of World War II and Cold War-era Munitions Storage facilities executed by the ACHP (**Appendix F**). SHPO consultation and Section 106 compliance will be completed prior to finalizing this IDEA and FONSI. All activities potentially affecting cultural resources must be coordinated with the North Dakota SHPO, FUB, and 319 CES/CEA.
- **AT/FP Setback Requirements.** Minimum AT/FP design standards for new construction have been specified by the DOD and increase the land area required for individual facilities. Design standards for new construction are contained in Unified Facilities Criteria 4-010-01, Department of Defense Minimum Antiterrorism Standards for Buildings, October 2003, and augmented by USAF instructions. The USAF Force Protection Design Guide, published by the Air Force Center for Engineering and the Environment, supplements the DOD standards and must also be consulted during the planning and design processes. Grand Forks AFB has numerous existing road, parking, and perimeter setback issues that do not meet current AT/FP standards.

As a general practice, Grand Forks AFB seeks to avoid, wherever possible, any disturbance to sensitive areas, such as wetlands and floodplains. However, as future mission activities dictate, and due to the expanse of existing constrained areas on Grand Forks AFB, avoiding or restricting future development within this acreage may not be practical and could limit the installation's ability to successfully accomplish its missions. When these resources cannot be avoided, separate and additional NEPA documentation would occur and coordination with the appropriate regulatory agencies would be completed prior to initiating the action. All construction or other activities that would occur within areas of concern, such as ERP sites, would comply with the requirements of various Federal, state, and local policies and regulations that govern such resources.

2.1.2 Demolition Projects

This IDEA addresses eight facility demolition projects for the next 5 years to support future mission requirements (see **Table 2-1**). Demolition activities would remove an estimated 396,876 square feet (ft²) of facilities making space available for future development. These facilities have been deemed too costly to repair or renovate to meet the future mission requirements of Grand Forks AFB. Projects within this category include primarily the demolition of structures, but could also include demolition of parking and other pavements if they would be demolished together. The demolition of old or outdated facilities would minimize the area of undisturbed land required for new facilities. **Table 2-4** identifies projects that would be representative of the types of demolition projects proposed for implementation. The locations for these proposed projects in relation to constraints are shown in **Figure 2-4**.

Table 2-4. Representative Demolition Projects

Project Identification Number and Title	Fiscal Year	Area Demolished (ft ²)
D1. Demolish Munitions Storage Area Revised Plan (Buildings 712, 717, 719, 723 to 727, 729, 737, and 738)	2013	135,643
D2. Demolish Buildings 304 and 515 in support of Construct Consolidated Security Forces	2010	22,631
D3. Demolish Hangars 520, 521, 522, and 523	2012 and 2014	117,359

These demolition projects are described in detail because they would have the highest potential to impact the natural and man-made environments, and therefore are representative of the upper limits for potential impacts that reasonably could be expected from the other projects in the demolition projects category. For example, the projects Demolish Hangars 520, 521, 522, and 523 (Project D3), and Demolish Buildings 304 and 515 in support of Consolidated Security Forces (Project D2) would have the largest potential for surface disturbance in this category because they include a large demolition area. An example of a demolition project that could indirectly impact minimal wetland areas includes the project Demolish Munitions Storage Area (MSA) Revised Plan (Buildings 712, 717, 719, 723 to 727, 729, 737, and 738) (Project D1). The demolition of 35 buildings associated with the MSA Revised Plan was previously analyzed in an EA; however, not all buildings currently slated to be demolished were analyzed. All demolition projects that could impact properties listed in or potentially eligible for the NRHP would be subject to consultation with the North Dakota SHPO as per 36 CFR 800. In addition, all fill used for post-demolition activities would be obtained from an approved borrow pit and screened to ensure they contain no cultural resources. All trees and vegetation associated with facilities scheduled for demolition would be replaced or relocated as applicable and the area reseeded with native species.

2.1.3 Construction Projects

This IDEA addresses 12 construction projects over the next 5 years to support future mission requirements and to comply with AT/FP criteria (see **Table 2-2**). Grand Forks AFB proposes to construct 1,781,620 ft² of facilities, site improvements, and new pavements. Projects within this category include primarily new facility construction and additions to existing facilities, but could also include renovations, repairs, alterations, parking, and other pavements when these elements are a large relevant component of a facility construction project. The construction of new facilities would be zoned in accordance with appropriate land use areas in order to continue or enhance compatibility with currently designated land use areas. **Table 2-5** identifies projects that would be representative of the types of construction projects proposed for development. The proposed locations for these projects in relation to constraints are shown in **Figure 2-4**. These construction projects are described in detail because they are believed to be representative of the upper range of such projects and would have the highest potential to impact the natural and man-made environments, and therefore are representative of the upper limits for potential impacts that reasonably could be expected from the other projects in the construction projects category. For example, Construct Consolidated Security Forces (Project C1) and Construct BCE Pavements and Maintenance Facility/Snow Barn (Project C2) would have the potential to create the greatest surface disturbance compared to other construction projects. An example of a construction project that could directly and indirectly impact minimal wetland areas is Construct Indoor Small Arms Range (Project C3). All fill used for construction activities would be obtained from an approved borrow pit and screened to ensure they contain no cultural resources. All trees and vegetation impacted from construction activities would be replaced or relocated as applicable. All ground disturbed during construction activities that does not include site improvements would be covered with sod where appropriate.

Table 2-5. Representative Construction Projects

Project Identification Number and Title	Fiscal Year	Area Constructed (ft ²)
C1. Construct Consolidated Security Forces	2010	Facilities: 31,861 Site Improvements: 257,796 Pavements: 79,997
C2. Construct BCE Pavements and Maintenance Facility/Snow Barn	2012	Facilities: 45,003 Site Improvements: 80,729 Pavements: 86,111
C3. Construct Indoor Small Arms Range	2014	Facilities: 52,948 Site Improvements: 10,764 Pavements: 0

2.1.4 Infrastructure Projects

This IDEA addresses seven infrastructure projects over the next 5 years to support future mission requirements and to comply with AT/FP requirements (see **Table 2-3**). Infrastructure projects could disturb as much as 2,100,357 ft² of land, though approximately 1,958,247 ft² would involve only pavement resurfacing or repair and would not be expected to result in ground disturbance. Projects within this category include the removal or installation of or upgrades to paved roadways, sidewalks, parking lots, utilities, storm water systems, fences, and recreational facilities. **Table 2-6** identifies projects that are believed to be representative of the types of infrastructure upgrade projects proposed. The proposed locations for these projects in relation to constraints are shown in **Figure 2-4**. These representative facility infrastructure projects are described in detail because they are believed to be representative of the

upper range of potential impacts on the natural and man-made environment from such projects and thus frame the upper limits for potential impacts that reasonably could be expected from other projects in the infrastructure category. For example, the project Repair Runway - Mill and Overlay (Project I3) would have the potential to create the greatest surface disturbance of any of the infrastructure projects. An example of a road and parking lot repair project causing the most land disturbance would be Construct Road/Parking at Building 314 and 242 (Project I1). An example of an infrastructure project to address alternative energy solutions at Grand Forks AFB is Repair Heating, Ventilation, and Air Conditioning (HVAC) Ground Source Heat Pumps (GSHP) at Building 652 (Project I2). All fill dirt used for infrastructure construction activities would be obtained from an approved borrow pit and screened to ensure they contain no cultural resources. All trees and vegetation impacted from infrastructure construction activities would be replaced or relocated as applicable. All ground disturbed during construction activities that does not include site improvements would be reseeded with native species.

Table 2-6. Representative Infrastructure Projects

Project Identification Number and Title	Fiscal Year	Project Size (ft ²)
I1. Construct Access Road/Parking at Buildings 314 and 242	2012	114,300
I2. Repair HVAC-GSHP at Building 652	2010	11,710
I3. Repair Runway-Mill and Overlay (S/R)	2013	1,852,497

2.1.5 Summary of Proposed Activities

As a result of full implementation of the Proposed Action (including all projects identified in **Tables 2-1, 2-2, and 2-3**), there would be approximately 396,876 ft² of demolished buildings at Grand Forks AFB, resulting in a decrease of impervious surfaces of approximately 396,876 ft². Over the course of the next 5 years, there would be approximately 1,781,620 ft² of new facilities, site improvements, and new pavements constructed, resulting in an anticipated increase of 995,789 ft² of impervious surface. Additionally, there would be infrastructure upgrades and improvements. These infrastructure projects could disturb as much as 2,100,357 ft² of area and would increase impervious surfaces by approximately 115,200 ft². **Table 2-7** summarizes the anticipated changes.

Table 2-7. Change in Impervious Surfaces

Project Type	Total Project Area (ft ²)	Change in Impervious Surfaces (ft ²)
Demolition	396,876	-396,876
Construction	1,781,620	+995,789
Infrastructure	2,100,357	+115,200
Total	4,278,853	+1,507,865

Note: Change in impervious surfaces is not necessarily equivalent to the project area square footage because some facilities proposed for demolition are multiple stories, and many new facilities would be multiple stories. Furthermore, many infrastructure projects would include removal of pavements, or would disturb area but not add impervious surfaces. As noted in **Section 2.1.4**, approximately 1,958,247 ft² of the infrastructure project area would entail pavement resurfacing or repair, which would not likely result in ground disturbance.

2.2 Alternatives

During development of the Grand Forks AFB installation development plans and during the project siting phase, alternative locations for construction and infrastructure projects were evaluated and the best possible solution for project siting was selected based on numerous criteria (e.g., functional requirements, collocation of like services, and availability of sites). Based on this evaluation, the proposed locations for each of the construction and infrastructure projects were determined to be the best available. Each building scheduled for demolition was evaluated for potential reuse. Some facilities such as Buildings 705, 706, and 707 were removed from demolition because they were potentially eligible for the NRHP and could be reused for other mission functions. Those facilities scheduled for demolition and considered not suitable for reuse would be demolished as planned.

All of the representative IDEA projects have been evaluated individually and cumulatively in this IDEA to determine if the consequences of implementation would cause significant impacts on the human and natural environments of Grand Forks AFB and surrounding areas. Subsets of projects, considered as alternatives, have not been carried forward for further independent analysis based on the determination that subsets would not cause any additional impacts beyond that of the Proposed Action.

The individual projects would be prioritized and implemented as funding becomes available. The Proposed Action encompasses all the currently identified priority projects and the analysis describes the specific and cumulative consequences of implementing the IDEA plan. Since project phasing is expected to occur, based on the availability of funding, no phasing alternatives were carried forward for independent analysis.

2.2.1 Alternative 1 – Acquire Privately Owned Land Surrounding Grand Forks AFB

Under this alternative, Grand Forks AFB would purchase suitable land that is privately owned outside of the installation's present boundaries to construct some of the facilities needed for future mission requirements. Grand Forks AFB is surrounded on all sides by privately owned rural and agricultural lands. The DOD discourages installations from acquiring more land through purchases. The DOD is attempting to dispose of as many acres as possible of underutilized land at many installations in the United States. For these reasons, this alternative is not considered viable and is eliminated from further detailed analysis in the IDEA.

2.2.2 Alternative 2 – Lease Additional Facilities in the Surrounding Community

Under this alternative, Grand Forks AFB would lease office and warehouse space in the surrounding private sector community to house personnel and provide space for mission operations. This alternative would result in an insufficient span of control for the command and control function. The leased facilities would have great limitations in their ability to meet the DOD force protection requirements, resulting in high additional costs or noncompliance with force protection requirements. This alternative is not considered viable and is eliminated from further detailed analysis in the IDEA.

2.2.3 No Action Alternative

CEQ regulations require consideration of the No Action Alternative for all proposed actions. The No Action Alternative serves as a baseline against which the impacts of the Proposed Action and other

potential alternatives can be compared and consequently it is carried forward for further evaluation in this IDEA.

Under the No Action Alternative, the 319 ARW would not implement the projects proposed in the installation's community of plans. In general, implementation of the No Action Alternative would require that the 319 ARW continue to operate under substandard, inefficient, and, in some cases, unsafe conditions. Under the No Action Alternative, these deficiencies would impair the 319 ARW's future ability to successfully sustain current and future national security objectives and other mission requirements.

Through implementation of the No Action Alternative, future installation development projects would continue to be evaluated for potential effects on an individual project basis. The preparation of separate NEPA documents would be required for each project to evaluate potential environmental consequences. This alternative is carried forward for analysis as a baseline against which the impacts of the Proposed Action and potential alternatives can be evaluated.

2.3 Decision to be Made and Identification of the Preferred Alternative

In this IDEA, Grand Forks AFB has evaluated whether the Proposed Action would result in any significant impacts. If such impacts are predicted, Grand Forks AFB would provide mitigation to reduce impacts to below the level of significance, undertake the preparation of an EIS addressing the Proposed Action, or abandon the Proposed Action. The IDEA will also be used to guide Grand Forks AFB in implementing the Proposed Action in a manner consistent with USAF standards for environmental stewardship. The Preferred Alternative for the Proposed Action is set forth in **Section 2.1**.

3. Affected Environment

Section 3 describes the environmental resources and conditions most likely to be affected by the Proposed Action and provides information to serve as a baseline from which to identify and evaluate environmental and socioeconomic changes likely to result from implementation of the Proposed Action. Baseline conditions represent current conditions. The potential environmental impacts of the Proposed Action and the No Action Alternative on the baseline conditions are described in **Section 4**. In compliance with NEPA, CEQ guidelines, and USAF guidance in 32 CFR Part 989, as amended, the description of the affected environment focuses on those resources and conditions potentially subject to impacts.

3.1 Noise

3.1.1 Definition of the Resource

Sound is defined as a particular auditory effect produced by a given source, for example the sound of rain on a rooftop. Sound is measured with instruments that record instantaneous sound levels in decibels. The dBA metric is used to characterize sound levels that can be sensed by the human ear. “A-weighted” denotes the adjustment of the frequency range to what the average human ear can sense when experiencing an audible event.

Noise and sound share the same physical aspects, but noise is considered a disturbance while sound is defined as an auditory effect. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Noise can be intermittent or continuous, steady or impulsive, and can involve any number of sources and frequencies. It can be readily identifiable or generally nondescript. Human response to increased sound levels varies according to the source type, characteristics of the sound source, distance between source and receptor, receptor sensitivity, and time of day. How an individual responds to the sound source would determine if the sound is viewed as music to one’s ears or as annoying noise. Affected receptors are specific (e.g., schools, churches, or hospitals) or broad (e.g., nature preserves or designated districts) areas in which occasional or persistent sensitivity to noise above ambient levels exists.

Noise Metrics and Regulations. Sound levels, resulting from multiple single events, are used to characterize community noise effects from aircraft or vehicle activity and are measured in DNL. The DNL noise metric incorporates a “penalty” for evening and nighttime noise events to account for increased annoyance. DNL is the energy-averaged sound level measured over a 24-hour period, with a 10-dBA penalty assigned to noise events occurring between 10:00 p.m. and 7:00 a.m. DNL values are obtained by averaging single event values for a given 24-hour period. DNL is the preferred sound level metric used to characterize noise impacts of the FAA, U.S. Department of Housing and Urban Development (HUD), U.S. Environmental Protection Agency (USEPA), and DOD for modeling airport environments.

DNL is the metric recognized by the U.S. government for measuring noise and its impacts on humans. According to the USAF, the FAA, and the HUD criteria, residential units and other noise-sensitive land uses are “clearly unacceptable” in areas where the noise exposure exceeds a DNL of 75 dBA, “normally unacceptable” in regions exposed to noise between 65 dBA and 75 dBA, and “normally acceptable” in areas exposed to noise of 65 dBA or lower. The Federal Interagency Committee on Noise developed land use compatibility guidelines for noise in terms of DNL sound levels (USAF 2008c). For outdoor activities, the USEPA recommends a DNL sound level of 55 dBA as the sound level below which there is

no reason to suspect that the general population would be at risk from any of the effects of noise (FICON 1992).

Noise levels vary depending on the population density and proximity to land uses such as parks, schools, or industrial facilities. As shown on **Table 3-1**, noise levels in a suburban residential area are a DNL of about 55 dBA, which increases to 60 dBA for an urban residential area, and to 80 dBA in the downtown section of a city (USEPA 1974).

Table 3-1. Typical Outdoor Noise Levels

DNL (dBA)	Location
50	Residential area in a small town or quiet suburban area
55	Suburban residential area
60	Urban residential area
65	Noisy urban residential area
70	Very noisy urban residential area
80	City noise (downtown of major metropolitan area)
88	3rd floor apartment in a major city next to a freeway

Source: USEPA 1974

Most people are exposed to DNL sound levels of 50 to 55 dBA or higher on a daily basis. Studies specifically conducted to determine noise effects on various human activities show that about 90 percent of the population is not significantly bothered by outdoor sound levels below a DNL of 65 dBA (USAF 2008c). Studies of community annoyance in response to numerous types of environmental noise show that DNL correlates well with effect assessments and that there is a consistent relationship between DNL and the level of annoyance.

Construction Sound Levels. Building construction, modification, and demolition work can cause an increase in sound that is well above the ambient level. A variety of sounds are emitted from graders, pavers, trucks, welders, and other work activities and processes. **Table 3-2** lists sound levels associated with common types of construction equipment. These sound levels were predicted 50 feet from the source of the noise. Construction equipment usually exceeds the ambient sound levels by 20 to 25 dBA in an urban environment and up to 30 to 35 dBA in a quiet suburban area.

3.1.2 Existing Conditions

The ambient noise environment around Grand Forks AFB is affected mainly by military operations and automobile traffic. Military operations that impact the noise environment include aircraft operations and weapons training.

Grand Forks AFB is home to the 319 ARW and the 373rd Training Squadron, Detachment 10. Aircraft flown by these units include the KC-135 Stratotanker aircraft. In 1995, an Air Installation Compatible Use Zone (AICUZ) study was conducted for the installation and was revalidated in 2003 (USAF 2003). The 65 to 75 dBA noise contours from the 2003 AICUZ study are shown in **Figure 2-2** extending roughly north, northwest, and south along the runway. The contours remain mostly on installation property. In addition to the noise contours from aircraft operations, noise contours from the Small Arms Ranges are also shown on **Figure 2-2**. The existing Small Arms Ranges are east of the runway. The 65 to 75 dBA noise contours encompass the Small Arms Ranges and some facilities to the east of the range. The contours only encompass installation property.

Table 3-2. Predicted Noise Levels for Construction Equipment

Construction Category and Equipment	Predicted Noise Level at 50 feet (dBA)
Clearing and Grading	
Bulldozer	80
Grader	80–93
Truck	83–94
Roller	73–75
Excavation	
Backhoe	72–93
Jackhammer	81–98
Building Construction	
Concrete mixer	74–88
Welding generator	71–82
Pile driver	91–105
Crane	75–87
Paver	86–88

Source: USEPA 1971

Vehicle use associated with military operations at Grand Forks AFB consists of passenger vehicles, delivery and fuel trucks, and military vehicles. Passenger vehicles compose most of the vehicles present at Grand Forks AFB and the surrounding community roadways.

Considering the military aircraft operations, military training operations, and vehicle traffic at and adjacent to Grand Forks AFB, the ambient sound environment around Grand Forks AFB is likely to resemble an urban atmosphere.

3.2 Land Use

3.2.1 Definition of the Resource

The term “land use” refers to real property classifications that indicate either natural conditions or the types of human activity occurring on a parcel. In many cases, land use descriptions are codified in local zoning laws. However, there is no nationally recognized convention or uniform terminology for describing land use categories. As a result, the meanings of various land use descriptions, “labels,” and definitions vary among jurisdictions. Natural conditions of property can be described or categorized as unimproved, undeveloped, conservation or preservation area, and natural or scenic area. There is a wide variety of land use categories resulting from human activity. Descriptive terms often used include residential, commercial, industrial, agricultural, institutional, and recreational. USAF installation land use planning commonly utilizes 12 general land use classifications: Airfield, Aircraft Operations and Maintenance, Industrial, Administrative, Community (Commercial), Community (Service), Medical, Housing (Accompanied), Housing (Unaccompanied), Outdoor Recreation, Open Space, and Water (USAF 1998).

Two main objectives of land use planning are to ensure orderly growth and compatible uses among adjacent property parcels or areas. According to Air Force Pamphlet 32-1010, *Land Use Planning*, land use planning is the arrangement of compatible activities in the most functionally effective and efficient manner (USAF 1998). The highest and best uses of real property are obtained when compatibility among land uses fosters societal interest. Tools supporting land use planning within the civilian sector include written master plans/management plans, policies, and zoning regulations. The USAF comprehensive planning process also utilizes functional analysis, which determines the degree of connectivity among installation land uses as well as between installation and off-installation land uses, to determine future installation development and facilities planning.

In appropriate cases, the location and extent of a proposed action needs to be evaluated for its potential effects on a project site and adjacent land uses. The foremost factor affecting a proposed action in terms of land use is its compliance with any applicable land use or zoning regulations. Other relevant factors include matters such as existing land use at the project site, the types of land uses on adjacent properties and their proximity to a proposed action, the duration of a proposed activity, and its “permanence.”

3.2.2 Existing Conditions

Surrounding Off-Installation Land Use. Grand Forks AFB is in Mekinock and Blooming Townships in east-central Grand Forks County, North Dakota, near the North Dakota-Minnesota state boundary. It is north of and adjacent to the City of Emerado and approximately 15 miles west of the City of Grand Forks (see **Figure 1-1**). Access to Grand Forks AFB is provided by U.S. Highway 2 and North Dakota County Road B-3, which form the installation’s southern and eastern boundaries, respectively. The area surrounding the installation is rural, consisting primarily of agriculture and open space (pasture, recreation, and wildlife habitat) with scattered residences. The major crops include potatoes, sugar beets, soybeans, corn, barley, spring wheat, sunflowers, and oats (GFAFB 2005). In addition to the urban uses in the City of Emerado, other uses surrounding Grand Forks AFB include a University of North Dakota-owned biological research area adjacent to the installation’s western boundary, and the installation sewage treatment system on a separate parcel of land east of the main installation.

Grand Forks AFB is surrounded by Mekinock Township to the west and north, Blooming Township to the east, Oakville Township to the south-southeast, and Chester Township to the south. Grand Forks County has jurisdiction over land use and zoning within Blooming and Chester Townships. The land use designations within Blooming and Chester Townships primarily include Agricultural or Vacant; however, there are several parcels designated Institutional or Public Land (installation family housing area and wastewater treatment plant, and Kellys Slough National Wildlife Refuge and Waterfowl Production Areas) east of the installation, and scattered Residential parcels. The primary future land use identified east and south of the installation is Agricultural and a small area in Chester Township south of Grand Forks AFB runway is designated as an Airport Protection Zone (Grand Forks County 2006a). The corresponding Grand Forks County zoning designations for these areas east and south of the installation include Airfield Reserve District and Airfield Preservation District, as well as Floodplain Overlay District (Grand Forks County 2009, Grand Forks County 2006b).

Mekinock and Oakville Townships and the City of Emerado enforce land use and zoning regulations within their boundaries and extraterritorial areas (Grand Forks County 2006a). However, no land use or zoning information was available for the Oakville Townships and City of Emerado.

On-Installation Land Use. Grand Forks AFB consists of 5,773 acres and has an average daily population of 4,919 people with active-duty personnel consisting of approximately 1,693 military and 376 civilian employees (Vanderhoff 2010). The 319 ARW, who, in addition to their main mission of air refueling and airlift of cargo and people, is also the host wing of the installation providing support to other tenants,

including the 373rd Training Squadron Detachment, the Air Force Audit Agency, Department of Homeland Security, and the USACE.

As discussed in **Section 2.1**, the Grand Forks AFB general plan identifies 10 land use categories: Administrative, Aircraft Operations and Maintenance (O&M), Airfield, Community, Housing Accompanied, Housing Unaccompanied, Industrial, Medical, Open Space, and Outdoor Recreation (USAF 2008d). **Figure 2-1** shows the land uses that have been defined at Grand Forks AFB. The dominant land use at Grand Forks AFB is the Airfield, which runs north-south and occupies the central portion of the installation. Due to their interdependent natures, Aircraft O&M and Industrial uses are found in close proximity to the Airfield. The main cantonment area is east of the airfield and includes all Administration, Housing (Accompanied and Unaccompanied), Medical, and Community uses; and most Outdoor Recreation uses. The primary land use west of the airfield is Open Space.

The proposed land use plan, as presented in the general plan, is similar to the existing land use categories; however, the proposed land use plan includes the following differences:

- Administrative uses will be consolidated in two areas along Steen Boulevard. The largest area, just west of the main entrance, will include most of the support administrative functions, while the other area will consist of the command and control functions.
- Aircraft O&M uses will be expanded to consist of one continuous band west of Eielson Street and east of the parking aprons (USAF 2006).

In addition to the 10 designated land uses, deer bow hunting and agricultural use (e.g., cultivation of hay) are permitted in specific areas of Grand Forks AFB (GFAFB 2009a, GFAFB 2005). Bow hunting is permitted on the installation, within the following areas: the unimproved area outside of the perimeter fence at the northwestern corner of the installation (commonly referred to as CE Park), a large area to the southwest of the airfield inside the installation perimeter fence, in the MSA fields, within the Sunflake neighborhood, surrounding the sewage treatment lagoons, to the west of the Holly neighborhood, and within the Prairie View shelterbelt to the north of the Prairie View Court neighborhood and Prairie View Nature Preserve. Additional areas are open for bow hunting including the golf course to the south of the runways, the North Horse Pasture and Trail area, and the South Trail in the Holly neighborhood depending on weather conditions. Hunting is not permitted within 200 feet of any building or dwelling within the authorized hunting area and in areas where training or other activities are occurring (GFAFB 2009a). CE Park is designated as Outdoor Recreation, and the area southwest of the airfield is designated as Open Space. Hay cultivation is permitted on Grand Forks AFB through the agricultural outlease program. There is one hay lease consisting of 664 acres covering several sites inside the airfield fence (west, north, and east of the runway) and outside of the airfield fence (southwest, south, and southeast of the runway) (USAF 2007). The hay lease areas inside the airfield fence are designated as Airfield land use, whereas the areas outside of the fence are Industrial, Airfield, and Open Space. An additional hay lease is in progress and is scheduled to commence in spring 2010.

Table 3-3 identifies the land use categories that each representative project is within. In addition, the project Demolish MSA Revised Plan (Buildings 712, 717, 719, 723 to 727, 729, 737, and 738) (Project D1) and Construct BCE Pavements and Maintenance Facility/Snow Barn (Project C2) are within explosives QD separation zones, or QD arcs. QD arcs are imaginary predetermined distances surrounding potential explosive sites that are established in order to limit damage in the unlikely event of a mishap (Grand Forks County 2006a). See **Section 3.11** for more information on safety at Grand Forks AFB.

Table 3-3. Land Use Categories of Representative Projects

Land Use Category	Representative Project
Industrial	<ul style="list-style-type: none"> • Demolish MSA Revised Plan (Buildings 712, 717, 719, 723 to 727, 729, 737, and 738) (Project D1) • Demolish Buildings 304 and 515 in support of Consolidated Security Forces (Project D2) • Demolish Hangars 520, 521, 522, and 523 (Project D3) • Construct Indoor Small Arms Range (Project C3) • Repair HVAC-GSHP at Building 652 (Project I2)
Airfield	<ul style="list-style-type: none"> • Construct BCE Pavements and Maintenance Facility/Snow Barn (Project C2) • Repair Runway-Mill and Overlay (S/R) (Project I3)
Aircraft O&M	<ul style="list-style-type: none"> • Demolish Hangars 520, 521, 522, and 523 (Project D3)
Administrative	<ul style="list-style-type: none"> • Construct Consolidated Security Forces (Project C1) • Construct Access Road/Parking at Buildings 314 and 242 (Project I1)

3.3 Air Quality

3.3.1 Definition of the Resource

In accordance with Federal Clean Air Act (CAA) requirements, the air quality in a given region or area is measured by the concentration of various pollutants in the atmosphere. The measurements of these “criteria pollutants” in ambient air are expressed in units of parts per million (ppm), milligrams per cubic meter (mg/m^3), or micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). The air quality in a region is a result not only of the types and quantities of atmospheric pollutants and pollutant sources in an area, but also surface topography, the size of the topological “air basin,” and the prevailing meteorological conditions.

The CAA directed the USEPA to develop, implement, and enforce strong environmental regulations that would ensure clean and healthy ambient air quality. To protect public health and welfare, USEPA developed numerical concentration-based standards, or National Ambient Air Quality Standards (NAAQS), for pollutants that have been determined to impact human health and the environment. USEPA established both primary and secondary NAAQS under the provisions of the CAA. NAAQS are currently established for six criteria air pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter (including particulate matter equal to or less than 10 microns in diameter [PM_{10}] and particulate matter equal to or less than 2.5 microns in diameter [$\text{PM}_{2.5}$]), and lead (Pb). The primary NAAQS represent maximum levels of background air pollution that are considered safe, with an adequate margin of safety to protect public health. Secondary NAAQS represent the maximum pollutant concentration necessary to protect vegetation, crops, and other public resources along with maintaining visibility standards. North Dakota has adopted a more stringent set of standards, termed the North Dakota Ambient Air Quality Standards (NDAAQS). **Table 3-4** presents the primary and secondary USEPA NAAQS and NDAAQS.

Table 3-4. National and State Ambient Air Quality Standards

Pollutant	Averaging Time	Standard Value		Federal Standard Type
		Federal	State	
CO	8-hour ^a	9 ppm (10 mg/m ³)	Same	Primary
	1-hour ^a	35 ppm (40 mg/m ³)	Same	Primary
NO ₂	Annual Arithmetic Mean	0.053 ppm (100 µg/m ³)	Same	Primary and Secondary
	1-hour	--	--	None
O ₃	8-hour ^b	0.075 ppm (147 µg/m ³)	Same	Primary and Secondary
	1-hour ^c	--	--	Primary and Secondary
Pb	Quarterly average	1.5 µg/m ³	Same	Primary and Secondary
	30-Day	--	--	
PM ₁₀	Annual Arithmetic Mean	--	--	--
	24-hour	150 µg/m ³ ^d	Same	Primary and Secondary
PM _{2.5}	Annual Arithmetic Mean ^e	15 µg/m ³	Same	Primary and Secondary
	24-hour ^f	35 µg/m ³	Same	Primary and Secondary
SO ₂	Annual Arithmetic Mean	0.030 ppm	0.023 ppm	Primary
	24-hour ^a	0.14 ppm	0.099 ppm	Primary
	3-hour ^a	0.5 ppm (1,300 µg/m ³)	Same	Secondary
	1-hour	--	0.273 ppm	None

Sources: USEPA 2008, NDDH 1998

Notes: Parenthetical values are approximate equivalent concentrations.

- Not to be exceeded more than once per year.
- To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. This standard is effective on May 27, 2008, and replaces the 1997 8-hour ozone standard of 0.08 ppm. However, the 1997 standard and its implementing rules remain in effect while USEPA undergoes rulemaking to transition to the 2008 standard.
- As of June 15, 2005, USEPA revoked the Federal 1-hour ozone standard in all areas except the 14 8-hour ozone nonattainment Early Action Compact Areas.
- Not to be exceeded more than once per year on average over 3 years.
- To attain this standard, the 3-year average of the weighted annual mean PM_{2.5} concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m³.
- To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m³. This standard is effective December 17, 2006.

Key: ppm = parts per million; mg/m³ = milligrams per cubic meter; µg/m³ = micrograms per cubic meter

Although O₃ is considered a criteria air pollutant and is measurable in the atmosphere, it is not often considered a regulated air pollutant when calculating emissions because O₃ is typically not emitted directly from most emissions sources. Ozone is formed in the atmosphere by photochemical reactions involving sunlight and previously emitted pollutants or "O₃ precursors." These O₃ precursors consist primarily of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) that are directly emitted from a wide range of emissions sources. For this reason, regulatory agencies attempt to limit atmospheric O₃ concentrations by controlling VOC pollutants (also identified as reactive organic gases) and NO₂.

As authorized by the CAA, USEPA has delegated responsibility for ensuring compliance with NAAQS to the states and local agencies. As such, each state must develop air pollutant control programs and promulgate regulations and rules that focus on meeting NAAQS and maintaining healthy ambient air quality levels. These programs are detailed in State Implementation Plans (SIPs) that must be developed by each state or local regulatory agency and approved by USEPA. A SIP is a compilation of regulations, strategies, schedules, and enforcement actions designed to move the state into compliance with all NAAQS. Any changes to the compliance schedule or plan (e.g., new regulations, emissions budgets, controls) must be incorporated into the SIP and approved by USEPA.

In 1997, USEPA initiated work on new General Conformity rules and guidance to reflect the new 8-hour O₃, PM_{2.5}, and regional haze standards that were promulgated in that year. The 1-hour O₃ standard will no longer apply to an area 1 year after the effective date of the designation of that area for the 8-hour O₃ NAAQS. The effective designation date for most areas was June 15, 2004. USEPA designated PM_{2.5} nonattainment areas in December 2004, and finalized the PM_{2.5} implementation rule in January 2005. No county in the state of North Dakota was identified as being nonattainment for the PM_{2.5} standard.

On September 22, 2009, the USEPA issued a final rule for mandatory greenhouse gas (GHG) reporting from large GHG emissions sources in the United States. The purpose of the rule is to collect comprehensive and accurate data on carbon dioxide (CO₂) and other GHG emissions that can be used to inform future policy decisions. In general, the threshold for reporting is 25,000 metric tons or more of CO₂ equivalent per year. The first emissions report is due in 2011 for 2010 emissions. Although GHGs are not currently regulated under the CAA, the USEPA has clearly indicated that GHG emissions and climate change are issues that need to be considered in future planning. GHGs are produced by the burning of fossil fuels and through industrial and biological processes.

Title V of the CAA Amendments of 1990 requires states and local agencies to permit major stationary sources. A major stationary source is a facility (i.e., plant, installation, or activity) that has the potential to emit more than 100 tons per year (tpy) of any one criteria air pollutant, 10 tpy of a hazardous air pollutant (HAP), or 25 tpy of any combination of HAPs.

Federal Prevention of Significant Deterioration (PSD) regulations also define air pollutant emissions from proposed major stationary sources or modifications to be “significant” if (1) a proposed project is within 10 kilometers of any Class I area, and (2) regulated pollutant emissions would cause an increase in the 24-hour average concentration of any regulated pollutant in the Class I area of 1 µg/m³ or more [40 CFR 52.21(b)(23)(iii)]. PSD regulations also define ambient air increments, limiting the allowable increases to any area’s baseline air contaminant concentrations, based on the area’s designation as Class I, II, or III [40 CFR 52.21(c)]. Because Grand Forks AFB is not within 100 kilometers of a Class I area, PSD regulations do not apply and are not discussed further in this EA.

3.3.2 Existing Conditions

Grand Forks AFB is located in Grand Forks County, which is within North Dakota Air Quality Control Region (AQCR) 172. AQCR 172 consists of the all counties in North Dakota with the exception of Metropolitan Fargo, North Dakota. As defined in 40 CFR 81.335, Grand Forks County is designated as attainment/unclassifiable for all criteria pollutants (USEPA 2002a).

The most recent emissions inventories for Grand Forks County and AQCR 172 are shown in **Table 3-5**. Grand Forks County is considered the local area of influence, and AQCR 172 is considered the regional area of influence for the air quality analysis.

Table 3-5. Local and Regional Air Emissions Inventory for the Proposed Action (2002)

	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO₂ (tpy)	PM₁₀ (tpy)	PM_{2.5} (tpy)
Grand Forks County, ND	3,786	2,952	22,947	1,381	12,711	2,034
AQCR 172	36,630	16,704	118,068	5,576	145,387	23,540

Source: USEPA 2002b

The U.S. Department of Energy, Energy Information Administration, estimates that gross CO₂ emissions in North Dakota were 53.55 million metric tons in 2005 (DOE/EIA 2005).

The North Dakota Department of Health (NDDH) regulates air quality for the State of North Dakota. Grand Forks AFB is classified as a major source of emissions and has an Air Pollution Control Title V Permit to Operate (NDDH 2007). As required by the NDDH, Grand Forks AFB calculates annual criteria pollutant emissions from stationary sources and provides this information to the NDDH. There are various sources on-installation that emit criteria pollutants and HAPs, including generators, boilers, hot water heaters, fuel storage tanks, gasoline service stations, surface coatings/paint booths, and miscellaneous chemical usage.

3.4 Geological Resources

3.4.1 Definition of the Resource

Geological resources consist of the Earth's surface and subsurface materials. Within a given physiographic province, these resources typically are described in terms of topography and physiography, geology, soils, and, where applicable, geologic hazards and paleontology.

Topography and physiography pertain to the general shape and arrangement of a land surface, including its height and the position of its natural and human-made features.

Geology is the study of the Earth's composition and provides information on the structure and configuration of surface and subsurface features. Such information derives from field analysis based on observations of the surface and borings to identify subsurface composition.

Soils are the unconsolidated materials overlying bedrock or other parent material. Soils typically are described in terms of their complex type, slope, and physical characteristics. Differences among soil types in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential affect their abilities to support certain applications or uses. In appropriate cases, soil properties must be examined for their compatibility with particular construction activities or types of land use.

3.4.2 Existing Conditions

Geology. Grand Forks AFB is in the Central Lowland Physiographic Province along the flat former glacial Lake Agassiz Plain. Bedrock strata dip gently towards the center of the Williston Structural Basin in the west (USAF 2006). Precambrian-aged bedrock (4.5 billion to 543 million years before present) is overlain by 130 feet of glacial till and 95 feet of lacustrine deposits. The glacial deposits are composed of silts and clays with occasional sand and gravel lenses (CBP 2008).

Topography. Grand Forks AFB is characterized by flat to gently sloped topography, with a northeastward slope of about 1.5 to 2 feet per mile on the installation (CBP 2008). Across the installation, elevations range from 900 feet above mean sea level (MSL) on the western side to 880 feet above MSL on the eastern side.

Soils. Grand Forks AFB is underlain by six loamy soil associations with varying amounts of sand: the Antler-Gilby-Svea, the Bearden-Antler, the Glyndon-Gardens, the Delle-Cashel, the Ojata, and the Wyndmere-Tiffany-Arveson (GFAFB 2003a). Soils at Grand Forks AFB are deep, fairly level, and somewhat poorly to moderately well-drained with a high shrink-swell potential (CBP 2008). These soils are also highly susceptible to wind erosion. Soil is loamy from 0 to 12 inches below ground surface (bgs); loam, silty loam, and very fine sandy loam from 12 to 26 inches bgs; and loam to clayey loam from 26 to 60 inches bgs (GFAFB 2007a).

Soils mapped at each site of the proposed representative projects are shown in **Table 3-6**. In sites where the representative projects involve construction or earthmoving activities (e.g., Projects C1, C2, C3, I1, and I2), soil limitations to construction were determined based on data available in the Natural Resources Conservation Service's web soil survey (NRCS 2009). Construction limitations were considered for roads, parking, and small building construction. Data on frost-heave potential, which could be problematic during winter months at Grand Forks AFB, were also analyzed.

Prime Farmland. Of the nine soil units mapped within the sites of the representative projects, six are considered prime farmland soils and one is considered prime farmland soil if drained (NRCS 2009). However, no agricultural use of these lands presently occurs or is planned to occur, and the land is not planned to be drained. Therefore, areas where these soils occur on the site would not be considered prime farmland.

3.5 Water Resources

3.5.1 Definition of the Resource

Water resources are natural and man-made sources of water that are available for use by and for the benefit of humans and the environment. Water resources relevant to Grand Forks AFB's location in North Dakota include groundwater, surface water, and floodplains. Hydrology concerns the distribution of water to water resources through the processes of evapotranspiration, atmospheric transport, precipitation, surface runoff and flow, and subsurface flow. Hydrology is affected by climatic factors such as temperature and wind direction and speed, topography, and soil and geologic properties.

Groundwater is water that exists in the saturated zone beneath the earth's surface, and includes underground streams and aquifers. It is an essential resource that functions to recharge surface water and is used for drinking, irrigation, and industrial processes. Groundwater typically can be described in terms of depth from the surface, aquifer or well capacity, water quality, recharge rate, and surrounding geologic formations.

Groundwater quality and quantity are regulated under several different programs. The Federal Underground Injection Control regulations, authorized under the Safe Drinking Water Act (SDWA), require a permit for the discharge or disposal of fluids into a well. The Federal Sole Source Aquifer regulations, also authorized under the SDWA, protect aquifers that are critical to water supply.

Surface water resources generally consist of wetlands, lakes, rivers, and streams. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale.

Table 3-6. Properties of Soils Mapped at the Proposed Representative Projects

Mapping Unit	Texture	Project	Farmland Classification	Construction Limitations
Antler	silty clay loam (0 to 1 percent slopes)	C2, C3, I2, I3	Not prime farmland soil	Somewhat limited for building construction due to shrink-swell potential.
Averson	loam (0 to 1 percent slopes)	I1	Prime farmland soil if drained	High potential for frost action.
Embden	fine sandy loam (2 to 6 percent slopes)	I3	Prime farmland soil	Not analyzed. No construction associated with Project I3.
Gilby	loam (0 to 1 percent slopes)	D2, D3	Not prime farmland soil	Not analyzed. No construction associated with Projects D2 or D3.
Gilby	loam (0 to 1 percent slopes)	I3	Prime farmland soil	Not analyzed. No construction associated with Project I3.
Gilby	silty clay loam (0 to 1 percent slopes)	I3	Prime farmland soil	Not analyzed. No construction associated with Project I3.
Glyndon	silt loam (0 to 1 percent slopes)	D1, D2, C1, C2, I3	Prime farmland soil	Somewhat limited for building construction due to shrink-swell potential.
Glyndon	loam (0 to 1 percent slopes)	I3	Prime farmland soil	Not analyzed. No construction associated with Project I3.
Grimstad	fine sandy loam (0 to 1 percent)	I3	Prime farmland soil	Not analyzed. No construction associated with Project I3.

Key:

C1 = Construct Consolidated Security Forces

C2 = Construct BCE Pavements and Maintenance Facility/Snow Barn

C3 = Construct Indoor Small Arms Range

D1 = Demolish Munitions Storage Area Revised Plan (Buildings 712, 717, 719, 723 to 727, 729, 737, and 738)

D2 = Demolish Buildings 304 and 515 in support of Construct Consolidated Security Forces

D3 = Demolish Hangars 520, 521, 522, and 523

I1 = Construct Access Road/Parking at Buildings 314 and 242

I2 = Repair HVAC-GSHP-CATM-Building 652

I3 = Repair Runway-Mill and Overlay (S/R)

Waters of the United States are defined within the Clean Water Act (CWA), as amended, and jurisdiction is addressed by the USEPA and the USACE. These agencies assert jurisdiction over (1) traditional navigable waters, (2) wetlands adjacent to navigable waters, (3) nonnavigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-around or have continuous flow at least seasonally (e.g., typically 3 months), and (4) wetlands that directly abut such tributaries. Section 404 of the CWA authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredge or fill into waters of the United States including wetlands. Encroachment into waters of the United States and wetlands requires a permit from the state and the Federal government. Wetland hydrology is discussed within this section. **Section 3.6** provides a discussion of wetland habitat occurring within the action areas and adjacent wetlands that might be

affected by the actions being considered. A water body can be deemed impaired if water quality analyses conclude that exceedances of water quality standards, established by the CWA, occur. The CWA also mandated the National Pollutant Discharge Elimination System (NPDES) program, which requires a permit for any discharge of pollutants into waters of the United States.

The USEPA issued a Final Rule for the CWA concerning technology-based Effluent Limitations Guidelines and New Source Performance Standards for the Construction and Development point source category. All NPDES storm water permits issued by the USEPA or states must incorporate requirements established in the Final Rule. This Rule is effective February 1, 2010, and will be phased in over 4 years. All new construction sites are required to meet the non-numeric effluent limitations and design, install, and maintain effective erosion and sedimentation controls, including the following:

- Control storm water volume and velocity to minimize erosion
- Minimize the amount of soil exposed during construction activities
- Minimize the disturbance of steep slopes
- Minimize sediment discharges from the site
- Provide and maintain natural buffers around surface waters
- Minimize soil compaction and preserve topsoil where feasible.

In addition, construction site owners and operators that disturb one or more acres of land are required to use BMPs to ensure that soil disturbed during construction activities does not pollute nearby water bodies. Effective August 1, 2011, construction activities disturbing 20 or more acres must comply with the numeric effluent limitation for turbidity in addition to the non-numeric effluent limitations. The maximum daily turbidity limitation is 280 nephelometric turbidity units (ntu). On February 2, 2014, construction site owners and operators that disturb 10 or more acres of land are required to monitor discharges to ensure compliance with effluent limitations as specified by the permitting authority. The USEPA's limitations are based on its assessment of what specific technologies can reliably achieve. Permittees can select management practices or technologies that are best suited for site-specific conditions.

Construction activities such as clearing, grading, trenching, and excavating disturb soils and sediment. If not managed properly, disturbed soils and sediments can easily be washed into nearby water bodies during storm events, where water quality is reduced. Section 438 of the Energy Independence and Security Act (EISA) (42 U.S.C. Section 17094) establishes into law new storm water design requirements for Federal construction projects that disturb a footprint greater than 5,000 ft² of land. The project footprint consists of all horizontal hard surfaces and disturbed areas associated with the project development, including both building area and pavements such as roads, parking lots, and sidewalks. Note that these requirements do not apply to resurfacing of existing pavements. Under these requirements, predevelopment site hydrology must be maintained or restored to the maximum extent technically feasible with respect to temperature, rate, volume, and duration of flow. Predevelopment hydrology will be modeled or calculated using recognized tools and must include site-specific factors such as soil type, ground cover, and ground slope. Site design will incorporate storm water retention and reuse technologies such as bioretention areas, permeable pavements, cisterns/recycling, and green roofs to the maximum extent technically feasible. Post-construction analyses will be conducted to evaluate the effectiveness of the as-built storm water reduction features. As stated in a DOD memorandum dated January 19, 2010, these regulations will be incorporated into applicable DOD Unified Facilities Criteria (UFC) within 6 months (DOD 2010). Additional guidance is provided in the USEPA's *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act*.

Floodplains are areas of low-level ground present along rivers, stream channels, or coastal waters. The living and nonliving parts of natural floodplains interact with each other to create dynamic systems in which each component helps to maintain the characteristics of the environment that supports it. Floodplain ecosystem functions include natural moderation of floods, flood storage and conveyance, groundwater recharge, nutrient cycling, water quality maintenance, and diversification of plants and animals. Floodplains provide a broad area to spread out and temporarily store floodwaters. This reduces flood peaks and velocities and the potential for erosion. In their natural vegetated state, floodplains slow the rate at which the incoming overland flow reaches the main water body.

Floodplains are subject to periodic or infrequent inundation due to rain or melting snow. Risk of flooding typically hinges on local topography, the frequency of precipitation events, and the size of the watershed above the floodplain. Flood potential is evaluated by the Federal Emergency Management Agency (FEMA), which defines the 100-year floodplain. The 100-year floodplain is the area that has a 1 percent chance of inundation by a flood event in a given year. Certain facilities inherently pose too great a risk to be in either the 100- or 500-year floodplain, such as hospitals, schools, or storage buildings for irreplaceable records. Federal, state, and local regulations often limit floodplain development to passive uses, such as recreational and preservation activities, to reduce the risks to human health and safety.

EO 11988, Floodplain Management, requires Federal agencies to determine whether a proposed action would occur within a floodplain. This determination typically involves consultation of FEMA Flood Insurance Rate Maps, which contain enough general information to determine the relationship of the project area to nearby floodplains. EO 11988 directs Federal agencies to avoid floodplains unless the agency determines that there is no practicable alternative.

3.5.2 Existing Conditions

Groundwater. Groundwater within Grand Forks County is found in bedrock and overlying unconsolidated glacial drift deposits. Bedrock aquifers include rocks from the Dakota Group from the Ordovician Period (approximately 490 to 445 million years before present), and the overlying Pierre Formation from the Cretaceous Period (approximately 145 to 65 million years before present). Groundwater movement is primarily to the east, and Grand Forks County is part of a large artesian discharge area (GFAFB 2005, NDGS 1970).

The deepest aquifer is found in the Ordovician Red River Formation. Yield varies depending on joints and fractures within the formation, and the groundwater is very saline. The Dakota Group aquifer is the principal groundwater aquifer among the Great Plains states. Groundwater is present within the Dakota Group at about 100 to 200 feet bgs. This aquifer is confined and under pressure, delivering groundwater to wells at rates ranging from 2 to 50 gallons per minute (gpm). Water in the Dakota Group aquifer is primarily used for livestock watering as it is very saline and considered unsuitable for domestic consumption or industrial use. The water level within the aquifer has dropped nearly 20 feet in the past several years due to increased use for agricultural purposes (GFAFB 2005).

The uppermost aquifer is the Emerado Aquifer, present at 50 to 75 feet bgs. Groundwater is confined under an artesian head, and well yields can vary from rates of 50 to 500 gpm. Water quality within the aquifer is poor, with high levels of dissolved solids and salinity. This is potentially attributable to upward seepage of groundwater from bedrock aquifers (GFAFB 2005).

Potable water for the installation is obtained from surface water sources including the Red River and Red Lake River through the City of Grand Forks (GFAFB 2005).

Surface Water. Surface water surrounding Grand Forks AFB includes rivers, streams, and numerous wetlands (see **Figure 3-1**). Two primary bodies of water are present at Grand Forks AFB: Turtle River and Kellys Slough within the Kellys Slough National Wildlife Refuge. Just beyond the southern boundary of the installation is Hazen Brook, which flows to the east along the southern side of US Highway 2.

Turtle River flows through the northwestern corner of the installation boundary, meandering in a northeasterly direction. Turtle River is within the Red River Drainage Basin, emptying into the Red River, which empties into Lake Winnipeg in Canada. Peak flows occur in April, and minimum flows occur in January and February. Turtle River has been classified as a Class 2 stream by the NDDH, with water quality sufficient to sustain fish populations and suitable for irrigation and recreational purposes (GFAFB 2007a). However, the Turtle River can have high concentrations of total dissolved solids, particularly calcium and magnesium. Surface water flow is generally to the east-northeast.

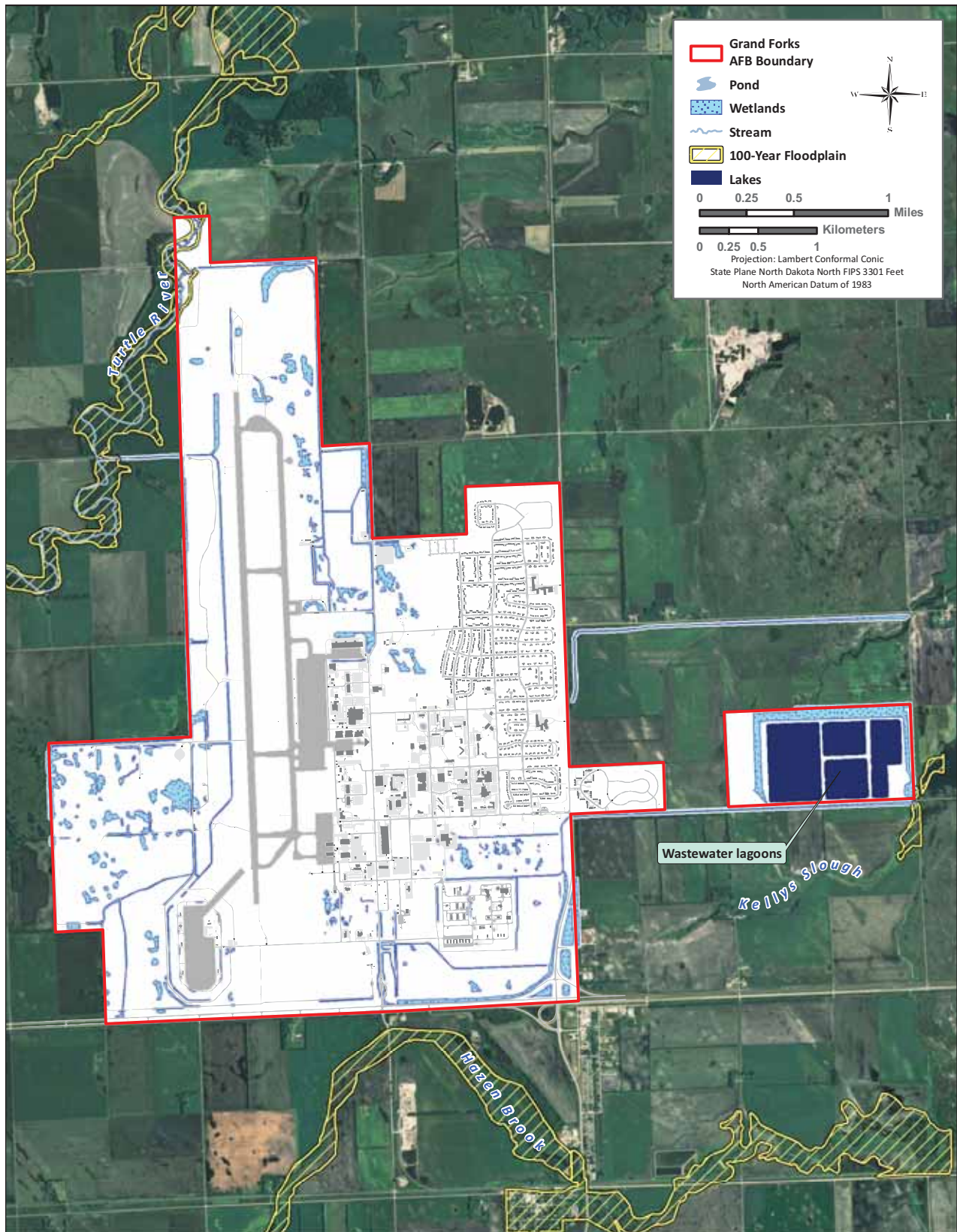
Kellys Slough is within a wide marshy floodplain approximately 2 miles from the installation. Surface water runoff is received from the eastern half of Grand Forks AFB; effluent is also received from water treatment lagoons maintained by the installation and located to the east of Grand Forks AFB. Kellys Slough flows to the northeast into the Turtle River and eventually into the Red River.

The Red River runs beyond the eastern portion of the installation, approximately 15 miles away. The Red Lake River supplies a portion of the drinking water supply to Grand Forks AFB. The Red Lake River is approximately 57 miles to the northeast of the installation.

Storm water drainage at Grand Forks AFB occurs through four drainage ditches and seven outfalls located in the north, west, and east of the installation. The outfalls convey drainage into Kellys Slough and eventually into Turtle River. Facilities on Grand Forks AFB discharge sanitary wastewater to sewage treatment lagoons to the east of the main installation. The sewage treatment lagoons are approximately 320 acres and discharge to the east into Kellys Slough (GFAFB 2009b). The sewage treatment lagoons are classified as lakes according to the National Wetlands Inventory. For a detailed discussion of the sewage treatment lagoons, see **Section 3.9.2**.

Floodplains. The Turtle River is the only river to cross the Grand Forks AFB boundary; therefore, a portion of the 100-year floodplain for the Turtle River is present in the northwesternmost corner of the installation (CBP 2008). In addition, there are also floodplains along the southeastern boundary of the sewage treatment lagoons associated with Kellys Slough.

Wetland Hydrology. Wetlands at Grand Forks AFB are classified as prairie potholes, meaning that they were formed from glacial activity. Prairie potholes are also called sloughs, and maintain wetland hydrology through inflow from surface water runoff, direct precipitation, and groundwater inflow entering the wetland (Stewart and Kantrud 1972). Prairie potholes experience extreme yearly and seasonal fluctuations in water depth. Variations in water depth often result in corresponding changes in salinity, with decreased salinity occurring when more water is present for dilution. Spring runoff from snowmelt provides a major source of water (Sloan 1972). Most outflows occur through seepage, and are attributable to the wetland depressions occurring in permeable glacial till. The presence of surface water is a controlling factor of the establishment and maintenance of marsh and aquatic vegetation and habitat (Stewart and Kantrud 1972). Wetland habitat and biota are discussed in **Section 3.6**.



Sources: Hydrography: Grand Forks AFB 2008; Aerial Photo: ArcGIS Microsoft Virtual Earth Premium Online Service, 2009.

Figure 3-1. Water Resources at Grand Forks AFB

3.6 Biological Resources

3.6.1 Definition of the Resource

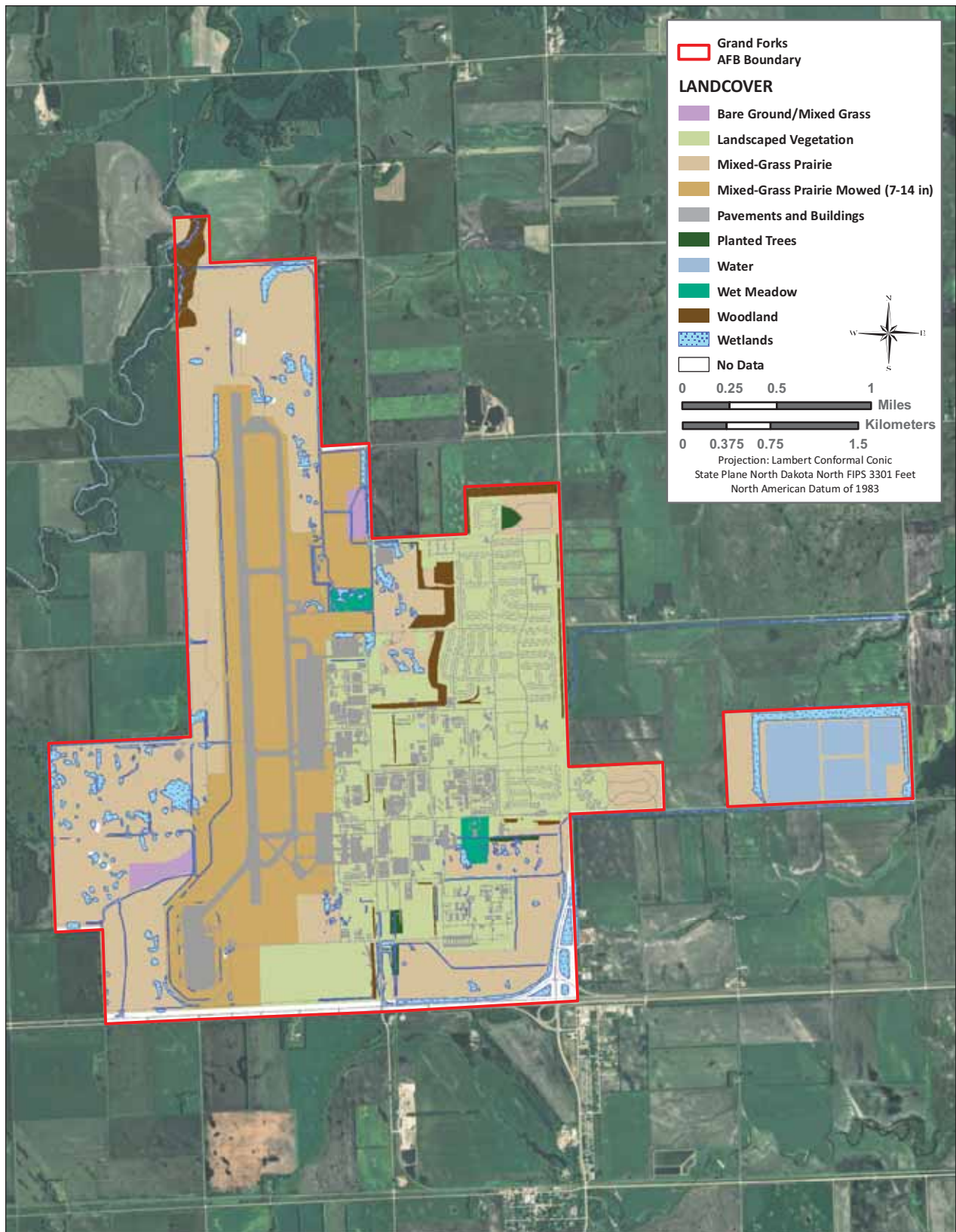
Biological resources include native or naturalized plants and animals and the habitats (e.g., wetlands, forests, and grasslands) in which they exist. Protected and sensitive biological resources include federally listed (endangered or threatened), proposed, and candidate species designated by the USFWS. Federal species of concern are not protected by law; however, these species could become listed, and therefore are given consideration when addressing biological resource impacts of an action. Sensitive habitats include those areas designated by the USFWS as critical habitat protected by the ESA and sensitive ecological areas as designated by state or Federal rulings. Sensitive habitats also include wetlands, plant communities that are unusual or of limited distribution, and important seasonal use areas for wildlife (e.g., migration routes, breeding areas, crucial summer and winter habitats).

Biological resources also include wetlands. Wetlands are important natural systems and habitats because of the diverse biological and hydrologic functions they perform. These functions include water quality improvement, groundwater recharge and discharge, pollution mitigation, nutrient cycling, unique plant and wildlife habitat provision, storm water attenuation and storage, sediment detention, and erosion protection. Wetlands are protected as a subset of the waters of the United States under Section 404 of the CWA. The term “waters of the United States” has a broad meaning under the CWA and incorporates deepwater aquatic habitats and special aquatic habitats (including wetlands). The USACE defines wetlands as “those areas that are inundated or saturated with ground or surface water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated conditions. Wetlands generally include swamps, marshes, bogs, and similar areas” (33 CFR Part 329).

Per Section 401 of CWA, any applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which could result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the state in which the discharge originates or will originate. North Dakota relies on Section 401 water quality certification as its primary form of state-level wetlands regulation. The Section 401 program is administered by the NDDH/Division of Water Quality (DWQ). In making certification decisions, the NDDH/DWQ is primarily concerned with the construction and environmental disturbance requirements pertaining to soils, surface waters, and fill materials. A nonregulatory agency policy document requires that “fragile and sensitive areas such as wetlands, riparian zones, delicate flora, or land resources will be protected against compaction, vegetation loss, and unnecessary damage.” If a project does not meet this and other minimum requirements of the NDDH/DWQ, the permit is denied, and necessary conditions are communicated before re-application (ELI 2008).

3.6.2 Existing Conditions

Vegetation. General vegetation cover types on Grand Forks AFB are shown in **Figure 3-2**. The installation has installed 8,776 trees and shrubs over the past 5 years. Protected and rare plant communities are discussed under *Protected and Sensitive Species*.



Sources: Hydrography: Grand Forks AFB 2008; Aerial Photo: ArcGIS Microsoft Virtual Earth Premium Online Service, 2009.

Figure 3-2. Vegetation Cover on Grand Forks AFB

When the initial construction of Grand Forks AFB was completed in the mid-1950s, most of the installation was planted with a standard mixture of grasses established by the DOD, which included two introduced grass species, smooth brome grass (*Bromus inermis*) and Kentucky blue grass (*Poa pratensis*). These two introduced grasses are still predominant throughout the installation. Large portions of the unimproved areas on Grand Forks AFB support the active cultivation of hay. In addition, 165 acres have been restored to native grasses and are used for the cultivation of hay. Trees planted in housing areas are primarily blue spruce (*Picea pungens*), green ash (*Fraxinus pennsylvanica*), and Lombardy poplar (*Populus nigra*). There are no known prairie remnants on Grand Forks AFB; however, some prairie index species, such as coneflowers (Asteraceae), are found in the unimproved and semi-improved areas mixed in with brome grass and various herbaceous annuals such as goldenrod (*Solidago* spp.). (GFAFB 2005). Grand Forks AFB is restoring portions of prairie areas on the installation including the Prairie View Nature Preserve located east of the Prairie View Court Military Family Housing (MFH) area and a 160-acre hay land area restored to native grasses around the MSA.

Grass heights within semi-improved areas, including airfield areas within 300 feet of the runway centerline, are maintained between 7 and 14 inches. Beyond the 300-foot border of the airfield, hay cutting dictates the height of the vegetation. Some former landfill areas have been seeded with native grasses (e.g., western wheatgrass [*Agropyron smithii*], thickspike wheatgrass [*A. dasystachum*], and slender wheatgrass [*A. trachycaulum*]) and sweet clover (*Melilotus species*) (GFAFB 2005).

One natural community, the wooded riparian corridor of the Turtle River, is represented within the installation boundaries. Dominant trees in this community are elm, cottonwood, and green ash. However, Dutch elm disease has killed many of the elms. European buckthorn (a highly invasive exotic species), chokecherry (*Prunus virginiana*), and wood rose (*Rosa woodsii*) are common understory species. Wood nettle (*Laportea canadensis*), stinging nettle (*Urtica dioica*), beggars-ticks (*Bidens frondosa*), and waterleaf (*Hydrophyllum virginianum*) are typical forbs (GFAFB 2005).

Turfgrass and landscaped areas dominate the cantonment area and MFH areas. Improved turfgrass areas on Grand Forks AFB are dominated by red fescue (*Festuca rubra*) and Kentucky bluegrass. Shelterbelts, composed mostly of American elm, green ash, Russian olive (*Elaeagnus angustifolia*), and cottonwoods, were planted in a number of locations to help protect housing and other main cantonment areas from wind, cold, and snow. The use of Russian olive at Grand Forks AFB has been eliminated due to their massive seed production and ability to rapidly overrun an area to the detriment of native species (GFAFB 2005).

Noxious weeds have been an increasing issue at Grand Forks AFB. Weed growth has expanded in areas that were improved (lawn) status to semi-improved and unimproved. Construction and demolition activities create disturbances that can increase the spread of noxious weeds. Public Law (P.L.) 93-629, *Federal Noxious Weed Act*, mandates control of noxious weeds by limiting possible weed seed transport from infested areas to noninfested sites. The spread of noxious weeds is controlled by avoiding activities in or adjacent to heavily infested areas, removing seed sources and propagules from the site prior to conducting activities, or limiting operations to nonseed-producing seasons. Following activities which expose the soil, mitigation can be achieved by covering the area with weed-seed free mulch or seeding the area with native species. Covering the soil reduces the germination of weed seeds, maintains soil moisture, and minimizes erosion.

The current list of noxious weeds on Grand Forks AFB includes absinth wormwood (*Artemisia absinthium*), Canada thistle (*Cirsium arvense*), diffuse knapweed (*Centaurea diffusa*), field bindweed (*Convolvulus arvensis*), leafy spurge (*Euphorbia esula*), musk thistle (*Carduus nutans*), spotted knapweed (*Centaurea maculosa*), and perennial sowthistle (*Sonchus arvensis*). Additional invasive species at the installation include bull thistle (*Cirsium vulgare*) and wavyleaf thistle (*Cirsium undulatum*). Invasive populations are greatest in areas that have been disturbed but are not mowed regularly.

Compliance with Federal and state law requires the development of an installationwide noxious weed control and monitoring program (GFAFB 2005).

Wildlife. The installation supports a remarkable diversity of wildlife given its size and location within an agricultural matrix. The Turtle River riparian corridor, Prairie View Nature Preserve, grassland areas on the western side of the installation, and the lagoons to the east of the installation all provide important habitat for native plant and wildlife species (GFAFB 2004).

Common mammals on the installation include white-tailed deer (*Odocoileus virginianus*), eastern cottontail (*Silvilagus floridanus*), white-tailed jackrabbit (*Lepus townsendii*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), beaver (*Castor canadensis*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), badger (*Taxidea taxus*), plains pocket gopher (*Geomys bursarius*), northern pocket gopher (*Thomomys talpoides*), muskrat (*Ondatra zibethica*), squirrels (*Sciurus* spp. and *Spermophilus* spp.), meadow vole (*Microtus pennsylvanicus*), shrews (*Sorex* spp.), white footed mouse (*Peromyscus leucopus*), deer mouse (*P. maniculatus*), meadow jumping mouse (*Zapus hudsonius*), silver-haired bat (*Lasionycteris noctivagans*), and red bat (*Lasiurus borealis*) (GFAFB 2005, GFAFB 2004).

A total of 218 bird species have been recorded at Grand Forks AFB (GFAFB 2004). Common bird species include brown-headed cowbird (*Molothrus ater*), clay-colored sparrow (*Spizella pallida*), western meadowlark (*Sturnella neglecta*), American goldfinch (*Spinus tristis*), red-winged blackbird (*Agelaius phoeniceus*), mourning dove (*Zenaida macroura*), cliff swallow (*Petrochelidon pyrrhonota*), and common grackle (*Quiscalus quiscula*) (USAF 2008e). During the 2007 migration and breeding bird surveys, the habitat types with the most bird species observed during the migration period (May) included the lagoons east of the main installation (46 species), shallow marsh (33 species), open field (32 species), and riparian woodland (31 species). The habitat types with the most bird species observed during the breeding season (June) included the lagoons east of the main installation (41 species), open field (35 species), and the shallow marsh (35 species) (USAF 2008e). Breeding birds documented at the installation that are species of conservation concern or state-listed are listed in **Appendix E**. Common reptiles and amphibians occurring on Grand Forks AFB include the western painted turtle (*Chrysemys picta belli*), common garter snake (*Thamnophis sirtalis*), tiger salamander (*Ambystoma tigrinum*), wood frog (*Rana sylvatica*), northern leopard frog (*Rana pipiens*), and Dakota toad (*Bufo hemiophys*).

Minnows and carp have been identified on Grand Forks AFB (GFAFB 2005, GFAFB 2007b). In addition, some game fish species occur in portions of the Turtle River, which crosses the northernmost portion of Grand Forks AFB, including northern pike (*Esox lucius*), white sucker (*Catostomus commersonii*), rock bass (*Ambloplites rupestris*), black bullhead (*Ameiurus melas*), and channel catfish (*Ictalurus punctatus*). The State of North Dakota stocks the Turtle River upstream of Grand Forks AFB with brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) each spring near Turtle River State Park (GFAFB 2005).

Protected and Sensitive Species. No federally listed threatened or endangered species are known to occur on Grand Forks AFB (GFAFB 2005). There is no critical or significant habitat present on Grand Forks AFB. Species listed by the USFWS as having the potential to reside in the vicinity include the gray wolf (*Canis lupus*). The gray wolf, federally listed as endangered, is infrequently observed in North Dakota and no records of its presence on Grand Forks AFB exist (GFAFB 2006).

The North Dakota Natural Heritage Program compiled the State Threatened and Endangered List. Five major criteria are considered in evaluating a species: (1) occurrence, (2) vulnerability, (3) type(s) of threat, (4) degree of protection, and (5) taxonomy. A species is considered critically endangered if it received a state rank of S1 (critically imperiled), endangered if it received a state rank of S2 (imperiled), or threatened if it received a state rank of S3 (vulnerable). Two species found on the installation during the 2007 field season are considered to be state-listed as endangered. These include the bald eagle

(*Haliaeetus leucocephalus*) with a state rank of S1 (critically imperiled) and the merlin (*Falco columbarius*) with a state rank of S2 (imperiled). Seven species found on the installation during the 2007 field season have a state rank of S3 (vulnerable) and are considered threatened in North Dakota. These include the chestnut-sided warbler (*Dendroica pensylvanica*), common goldeneye (*Bucephala clangula*), green heron (*Butorides virescens*), hooded merganser (*Lophodytes cucullatus*), Philadelphia vireo (*Vireo philadelphicus*), swamp sparrow (*Melospiza georgiana*), and white-throated sparrow (*Zonotrichia albicollis*) (USAF 2008e). The bald eagle, common goldeneye, green heron, and hooded merganser were detected near the open-water lagoons to the east of the main installation. The Philadelphia vireo was utilizing a shelterbelt on the installation. The chestnut-sided warbler and the white-throated sparrow were observed in the riparian woodland. The swamp sparrow was observed in a shallow marsh. A merlin was observed in a neighborhood. Several merlin nests have been observed in previous years at Grand Forks AFB and the surrounding area (USAF 2008e).

The North Dakota Game and Fish Department has identified 100 species as Species of Conservation Priority as part of its *Comprehensive Wildlife Conservation Strategy*. There are 22 bird species and 2 mammal species that have been observed on Grand Forks AFB that are included in North Dakota's 100 Species of Conservation Priority (see **Table 3-7**). Level I species are those having a high level of conservation priority because of declining status in North Dakota or across their range; or have a high rate of occurrence in North Dakota, constituting the core of the species breeding range, but might be at risk rangewide. Level II species are those having a moderate level of conservation priority. Level III species are those having a moderate level of conservation priority but are believed to be peripheral or non-breeding in North Dakota. Eleven conservation priority species on Grand Forks AFB are classified as Level I species, 12 species are classified as Level II, and 1 species is classified as Level III.

Migratory birds are protected under the Migratory Bird Treaty Act of 1918 and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*. The vast majority of birds occurring on Grand Forks AFB are migratory birds. Eighty-six species of neotropical migratory birds have been observed on the installation. Neotropical migratory birds are those species that spend approximately 8 months of the year wintering in Central and South America and the remaining months on their breeding grounds in North America's temperate latitudes. Clearly, numerous neotropical migrant species utilize the various habitats on the installation, either as a migratory stopover habitat or for breeding (USAF 2008e).

Although bald eagles were recently delisted from the ESA, they are still protected under the Bald and Golden Eagle Protection Act of 1984. The bald eagle migrates statewide during the spring and fall, but it generally follows the major river systems of the state. Bald eagles were observed to use the sewage lagoons to the east of the main installation for fall forage from 2003 through 2007 (GFAFB 2008a). No critical habitat for this species has been designated in Grand Forks County.

In 1994 and 2008, the North Dakota Parks and Recreation Department completed an inventory of protected and rare plant communities on Grand Forks AFB. In addition, another survey was completed in 2004 by 319 CES/CEA. During these studies, 147 taxa were identified on Grand Forks AFB (GFAFB 2004, GFAFB 2005). The North Dakota Natural Heritage Inventory identified two state-listed species on the western and eastern sides of Grand Forks AFB: the large yellow lady's slipper (*Cypripedium calceolus*), classified as state-vulnerable; and the small yellow lady's slipper (*Cypripedium parviflorum*), classified as state-imperiled/state-vulnerable (GFAFB 2004). No projects associated with the Proposed Action would be located in the vicinity of these plant species. No federally threatened or endangered plant species were identified on Grand Forks AFB.

Table 3-7. Species of Conservation Priority Observed on Grand Forks AFB

Common Name	Scientific Name	Level I, II, or III
Birds		
Baird's sparrow	<i>Ammodramus bairdii</i>	I
Black tern	<i>Chlidonias niger</i>	I
Chestnut-collared longspur	<i>Calcarius ornatus</i>	I
Ferruginous hawk	<i>Buteo regalis</i>	I
Franklin's gull	<i>Larus pipixcan</i>	I
Grasshopper sparrow	<i>Ammodramus savannarum</i>	I
Horned grebe	<i>Podiceps auritus</i>	I
Swainson's hawk	<i>Buteo swainsoni</i>	I
Upland sandpiper	<i>Bartramia longicauda</i>	I
Willet	<i>Catoptrophorus semipalmatus</i>	I
Wilson's phalarope	<i>Phalaropus tricolor</i>	I
American avocet	<i>Recurvirostra americana</i>	II
Bald eagle	<i>Haliaeetus leucocephalus</i>	II
Bobolink	<i>Dolichonyx oryzivorus</i>	II
Canvasback	<i>Aythya valisineria</i>	II
Le Conte's sparrow	<i>Ammodramus leconteii</i>	II
Loggerhead shrike	<i>Lanius ludovicianus</i>	II
Northern harrier	<i>Circus cyaneus</i>	II
Northern pintail	<i>Anas acuta</i>	II
Redhead	<i>Aythya americana</i>	II
Sedge wren	<i>Cistothorus platensis</i>	II
Sharp-tailed grouse	<i>Tympanuchus phasianellus</i>	II
Mammals		
Richardson's ground squirrel	<i>Spermophilus richardsonii</i>	II
Arctic shrew	<i>Sorex arcticus</i>	III

Source: Hagen et al. 2005

Wetland Habitat. The Red River Basin contains thousands of natural wetlands and prairie potholes. These wetlands have a profound effect on the hydrologic flow regime of streams and the residence time of water within the basin. These wetland areas generally occur in areas of poorly drained soils in shallow depressions formed on glacial and lacustrine plains. Wetlands on Grand Forks AFB occur frequently in drainageways, low-lying depressions, and potholes (see **Figure 3-1**).

According to Grand Fork AFB's GIS data for the wetland delineation performed at Grand Forks AFB in July 2006, 300 wetlands were identified on Grand Forks AFB. Of those, 82 wetlands composing 150.8 acres were determined to be federally jurisdictional wetlands under Section 404 of the CWA by the USACE. Forty-five wetlands composing 6.7 acres were identified and determined nonjurisdictional by the USACE. Data forms for the remaining 173 wetlands composing 147.1 acres on Grand Forks AFB have not yet been submitted to the USACE for jurisdictional determination; therefore, their jurisdictional status is undetermined. **Figure 3-1** shows the wetlands delineated on Grand Forks AFB.

Of the 82 jurisdictional wetlands (150.8 acres) on Grand Forks AFB, 71 of these (146.2 acres) are associated with drainage ditches. Although many if not all of these drainage ditches are man-made, because of the hydrologic interconnections of these ditches and eventual drainage into a navigable waterway (Red River) via Turtle River, these wetlands were determined to be federally jurisdictional by the USACE (GFAFB 2007c). Approximately 98 acres (62 wetlands) of the jurisdictional wetlands on the installation are palustrine emergent, 47 acres (15 wetlands) are palustrine scrub-shrub, 3 acres (3 wetlands) are palustrine forested, and 3 acres (2 wetlands) are riverine streambed wetlands.

Drainageways and low-lying depressions on Grand Forks AFB have limited and localized wetland habitat. Species most commonly associated with these wetland areas are hairyfruit sedge (*Carex trichocarpa*), needle spike-rush (*Eleocharis acicularis*), flat-stem spike-rush (*E. compressa*), pale spike-rush (*E. palustris*), Baltic rush (*Juncus balticus*), grass-leaf rush (*J. marginatus*), knotted rush (*J. nodosus*), poverty rush (*J. tenuis*), Torrey's rush (*J. torreyi*), and chairmaker's bulrush (*Scirpus americanus*) (GFAFB 2005).

3.7 Cultural Resources

3.7.1 Definition of the Resource

Cultural resources is an umbrella term for many heritage-related resources, including prehistoric and historic sites, buildings, structures, districts, or any other physical evidence of human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or any other reason. Depending on the condition and historic use, such resources might provide insight into the cultural practices of previous civilizations or they might retain cultural and religious significance to modern groups.

Several Federal laws and regulations govern protection of cultural resources, including the National Historic Preservation Act (NHPA) of 1966, the Archaeological and Historic Preservation Act (1974), the American Indian Religious Freedom Act (1978), the Archaeological Resources Protection Act (1979), and the Native American Graves Protection and Repatriation Act (NAGPRA) (1990).

Typically, cultural resources are subdivided into archaeological resources (prehistoric or historic sites, where human activity has left physical evidence of that activity but no structures remain standing); architectural resources (buildings or other structures or groups of structures, or designed landscapes that are of historic or aesthetic significance); or resources of traditional, religious, or cultural significance to Native American tribes.

Archaeological resources comprise areas where human activity has measurably altered the earth, or deposits of physical remains are found (e.g., projectile points and bottles).

Architectural resources include standing buildings, bridges, dams, and other structures of historic or aesthetic significance. Generally, architectural resources must be more than 50 years old to be considered eligible for the NRHP. More recent structures, such as Cold War-era resources, might warrant protection if they are of exceptional importance or if they have the potential to gain significance in the future.

Resources of traditional, religious, or cultural significance to Native American tribes can include archaeological resources, structures, neighborhoods, prominent topographic features, habitat, plants, animals, and minerals that Native Americans or other groups consider essential for the preservation of traditional culture.

The EA process and the consultation process prescribed in Section 106 of the NHPA require an assessment of the potential impact of an undertaking on historic properties that are within the proposed project's Area of Potential Effect (APE), which is defined as the geographic area(s) "within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." Under Section 110 of the NHPA, Federal agencies are required to inventory resources under their purview and nominate those eligible to the NRHP. In accordance with the NHPA, consultation with the SHPO is required regarding determination of potential effects of an undertaking on historic properties. Federally recognized Native American tribes would be consulted with in accordance with EO 13175, *Consultation and Coordination With Indian Tribal Governments* (November 9, 2000).

3.7.2 Existing Conditions

Although Grand Forks AFB began in 1954 with the escalation of the Cold War between the United States and the Soviet Union, it is an installation rich in history. Several archaeological investigations have been conducted at Grand Forks AFB. Surveyed areas generally include the area around the north end of the runway to the installation boundaries, the area between the west boundary and the runway, the area from the southwest corner of the runway to the west and south installation boundaries, and the area along the south boundary and southeast corner up to developed acreage at the south edge of the installation. The remainder of acreage at the installation is previously disturbed due to construction grading for the Air Force facilities. An archaeological survey was conducted in 1989 on the western side of the installation for Section 106 compliance for the proposed Peacekeeper Rail Garrison program (USAF 2008b). The 1989 survey encompassed 364 acres total, 235 acres within the installation boundaries at the southwestern corner of the runway. The 1989 survey identified two archaeological sites, a low-density prehistoric lithic scatter (32GF124), the remains of the 19th-century Mulligan farmstead (32GF125), two isolated prehistoric finds (32GFX304 and 32GFX305), and one historic find (32GFX329). All were evaluated as not eligible for the NRHP and the North Dakota SHPO concurred with these findings.

An installationwide survey was conducted in 1996 to locate and inventory cultural resources (USAF 2008b). The 1996 survey identified four sites of historic farmsteads (one with an isolated prehistoric flake), one isolated prehistoric find, and two isolated historic finds. All were evaluated as not eligible for the NRHP. The research design for the 1996 survey divided the installation into areas of high, medium, and low probability for archaeological resources. Areas of high probability are located in the northwestern corner of the installation boundary on the Turtle River terrace (approximately 100 acres) and at three historic sites west of the runway. An area of medium probability was identified along the Emerado Beach ridge (1,400 acres) along the northern end of the runway. Low probability areas include 1,400 acres at the northeastern corner of the runway, east and west sides of the runway, and along the southern installation boundary; and 3,479 acres of previously disturbed land composing the remaining acreage on the installation. In total, approximately 975 of the acres thought to be of high or low probability for archaeological sites have been surveyed to date.

Grand Forks AFB was constructed just over 50 years ago, and buildings at the installation are just now reaching the age guideline for potential NRHP-eligibility. A list of these facilities that would reach 50 years or older by 2014 is provided in **Appendix E**. In addition, Grand Forks AFB has Cold War-era buildings that have the potential to be eligible under Criterion Consideration G of the NHPA if they are considered exceptionally significant within the past 50 years. In 1994, HQ AMC began a reconnaissance survey of Cold War resources nationwide including at Grand Forks AFB, and the findings were presented in *Grand Forks Air Force Base, Grand Forks, North Dakota, Inventory of Cold War Properties* (Weitze 1996). The study inventoried 242 resources associated with Grand Forks AFB across the upper midwestern United States; however most were missile silos and associated buildings and structures located off-installation, with only 27 surveyed buildings located within the Grand Forks AFB installation boundaries. The USAF determined that Building 714 was eligible for NRHP listing and the North Dakota

SHPO concurred. The North Dakota SHPO did not concur with several of the USAF's determinations of ineligibility; consequently, Buildings 313, 606, 703, 704, 705, 706, and 707 are considered potentially eligible for NRHP listing and are treated as such for management purposes. Building 714, historically a checkout and assembly building associated with Minuteman and the Project Big Star mobile-rail deployment, is located in the MSA. Building 313 was not surveyed during the 1996 Cold War inventory; however, the North Dakota SHPO suggested it could be considered potentially eligible for associations with the Minuteman Missile Wing. Building 313 was historically a Missile Training Facility constructed in 1965, and has most recently been used as a High-Bay Technical Training Center. Building 313 was renovated in 2002 and the North Dakota SHPO concurred in the USAF's determination that the undertaking had no adverse effects. Building 606, historically a Transfer Building associated with both the Minuteman II and III programs, is located on the eastern side of the runway. Buildings 703 to 707 are Cold War-era ammunition storage facilities. On June 22, 2009, the SHPO concurred with a "no historic properties affected" determination concerning the demolition of Building 606. The ACHP issued a 2006 *Program Comment for World War II and Cold War Era (1939–1974) Ammunition Storage Facilities* on World II and Cold War-era ammunition storage facilities (ACHP 2006a), which went into effect on May 21, 2007, with USAF adoption (72 Federal Register 28462-28463). Under this PC, the USAF has fulfilled its Section 106 requirements for covered facilities, thus it does not need to consult on a case-by-case basis for undertakings, including demolition. The USAF, however, would inform the North Dakota SHPO on actions to buildings and structures covered under the Ammunition Storage PC.

Housing on Grand Forks AFB totaled 588 buildings in 2007. At that time, the oldest family housing extant on the installation was 144 Capehart housing buildings constructed in 1962; there were also 142 non-Capehart housing buildings constructed in 1964. The remainder of MFH was constructed in 1976 or after 1998. Plans called for the demolition or transfer of all 300 units constructed in 1962, 1964, and 1976 and the construction of 547 additional housing units (USAF 2008b). Grand Forks AFB consulted with the North Dakota SHPO on the proposed demolition and transfer of housing through FY 2007. The Capehart housing is covered under a PC issued by the ACHP to facilitate the USAF's compliance with Section 106 with respect to management of Capehart- and Wherry-era housing. None of the Capehart housing at Grand Forks AFB was considered of particular importance in conveying the significance of housing in this era. The North Dakota SHPO concurred with the finding of "No Historic Properties Affected" by the undertakings in letters dated September 20, 2006, and May 10, 2007, that are in the Integrated Cultural Resources Management Plan (ICRMP) (USAF 2008b).

A Programmatic Agreement (PA) was executed by HQ Air Force Space Command in 2005 for the disposition of NRHP-eligible and potentially eligible buildings at Grand Forks AFB related to the deactivation of the 321st Missile Group. Artwork in Buildings 306, 313, 513, 714, and 715 was documented as a form of mitigation in accordance with the Historic American Engineering Record (HAER) standards as stipulated in the PA. Buildings 606, 703, 704, and 714 are currently slated for demolition with mitigation requirements fulfilled as stipulated in the PA (GFAFB 2009c).

Grand Forks AFB has no known properties of traditional cultural significance or sacred sites based on tribal coordination to date. In 1995 and 2003, Grand Forks AFB sent letters to the seven tribes (Spirit Lake Tribe; Standing Rock Sioux Tribe of North and South Dakota; Three Affiliated Tribes of the Fort Berthold Reservation, North Dakota (Arikara, Hidatsa, Mandan); Turtle Mountain Band of Chippewa Indians of North Dakota; Lower Sioux Indian Community in the State of Minnesota; Prairie Island Indian Community of the State of Minnesota; and Red Lake Band of Chippewa Indians, Minnesota) inquiring whether there are any known sacred or culturally sensitive sites at Grand Forks AFB. No responses were received indicating known sacred or cultural sites at Grand Forks AFB. .

3.8 Socioeconomics and Environmental Justice

3.8.1 Definition of the Resource

Socioeconomic Resources. Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly characteristics of population and economic activity. Regional birth and death rates and immigration and emigration affect population levels. Economic activity typically encompasses employment, personal income, and industrial or commercial growth. Changes in these fundamental socioeconomic indicators are typically a result in changes to additional socioeconomic indicators, such as housing availability and the provision of public services. Socioeconomic data at county, state, and national levels permit characterization of baseline conditions in the context of regional, state, and national trends.

Demographics, employment characteristics, and housing occupancy status data provide key insights into socioeconomic conditions that might be affected by a proposed action. Demographics identify the population levels and the changes in population levels over time. Demographics data might also be obtained to identify a region's characteristics in terms of race, ethnicity, poverty status, educational attainment level, and other broad indicators.

Data on employment characteristics identify gross numbers of employees, employment by industry or trade, and unemployment trends. Data on personal income in a region can be used to compare the "before" and "after" effects of any increases in area wages as a result of a proposed action. Data on industrial or commercial growth or growth in other sectors of the economy provide baseline and trend line information about the economic health of a region.

Housing statistics provide baseline information about the local housing stock, the percentage of houses that are occupied, and the ratio of renters to homeowners. Housing statistics allow for baseline information to evaluate the impacts a proposed action might have upon housing in the region.

In appropriate cases, data on an installation's expenditures in the regional economy help to identify the relative importance of an installation in terms of its purchasing power and influence in the job market.

Socioeconomic data shown in this section are presented at census tract, county, and state levels to characterize baseline socioeconomic conditions in the context of regional and state trends. Data have been collected from previously published documents issued by Federal, state, and local agencies; and from state and national databases (e.g., U.S. Bureau of Economic Analysis' Regional Economic Information System).

Environmental Justice. EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations requires that Federal agencies' actions substantially affecting human health or the environment do not exclude persons, deny persons benefits, or subject persons to discrimination because of their race, color, or national origin. The EO was created to ensure the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no groups of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, tribal, and local programs and policies. Consideration of environmental justice concerns includes race, ethnicity, and the poverty status of populations in the vicinity of a proposed action. Such information aids in evaluating whether a proposed action would render vulnerable any of the groups targeted for protection in the EO.

3.8.2 Existing Conditions

For the purpose of this socioeconomic analysis, four different spatial levels will be used; (1) Region of Influence (ROI), defined as the census tracts surrounding Grand Forks AFB, which are tracts 114, 117, and 120; (2) Grand Forks County, the county within which Grand Forks AFB is located; (3) Grand Forks Metropolitan Statistical Area (GFMSA), the nearest metropolitan area to Grand Forks AFB; and (4) the State of North Dakota. Data from the installation will also be used where applicable. The ROI illustrates socioeconomic characteristics for the area nearest Grand Forks AFB. Grand Forks County and the GFMSA represent the geographic area where most impacts from the Proposed Action would occur; therefore it is included in the analysis. The GFMSA includes Grand Forks County in North Dakota and Polk County in Minnesota. Data for the State of North Dakota provide baseline comparisons for the spatial levels mentioned above.

Demographics. The population of Grand Forks County decreased 6.5 percent from the 1990 U.S. Census population of 70,683 to the 2000 U.S. Census populations of 66,109. From 2000 to 2008 a slight increase (0.7 percent) in population occurred in Grand Forks County from 66,109 as reported in 2000 to 66,585 reported in 2008. The population of the GFMSA was estimated at 97,279 in 2008, a slight decrease (0.2 percent) from the population of 97,478 people reported from the 2000 U.S. Census, and substantially less than the 103,181 people reported from the 1990 U.S. Census.

In 2000, the ROI had a population of 10,695 people. Population data for the ROI are available only from the 2000 U.S. Census. The U.S. Census Bureau changed the census tract designations between the 1990 and 2000 U.S. Censuses and a 2008 population estimate is not available as the U.S. Census Bureau does not provide population estimates for Census Tracts between decennial censuses. The population in the State of North Dakota remained constant from 1990 to 2008 at approximately 640,000 (USCB 1990, USCB 2000, USCB 2008a). Complete population data are presented in **Table 3-8**.

Table 3-8. Population Data for 1990, 2000, and 2008

Location	Population			Percent Change in Population	
	1990	2000	2008	1990 to 2000	2000 to 2008
ROI	N/A	10,695	N/A	N/A	N/A
Grand Forks County	70,683	66,109	66,585	-6.5%	0.7%
GFMSA	103,181	97,478	97,279	-5.5%	-0.2%
North Dakota	638,800	642,200	641,481	0.5%	-0.1%

Source: USCB 1990, USCB 2000, USCB 2008a

Notes: N/A = Not available. The 1990 ROI population is unavailable as the census tract designations changed from 1990 to 2000. The 2008 ROI population is unavailable as the U.S. Census Bureau does not provide population estimates for Census Tracts between decennial censuses.

Employment Characteristics. The percentage of persons employed in the armed forces is 2 percent in the ROI, 4 percent in Grand Forks County, 3 percent in the GFMSA, and 1 percent in North Dakota. The largest percentage of employees by industry across all four spatial levels is the educational, health, and social services industry with 26 percent of the ROI, 30 percent of Grand Forks County, 30 percent of GFMSA, and 24 percent of the State of North Dakota. The second largest industry is the retail trade industry, the percentage of people employed within the retail trade industry ranges from 11 to 15 percent for the four areas of analysis. In the ROI, the third largest industry is the construction industry, representing 10 percent of all jobs. The third largest industry covers the arts, entertainment, recreation, accommodation, and food services, with 11 percent in Grand Forks County, 10 percent in GFMSA, and

8 percent in the State of North Dakota. For complete information regarding employment by industry see **Table 3-9**.

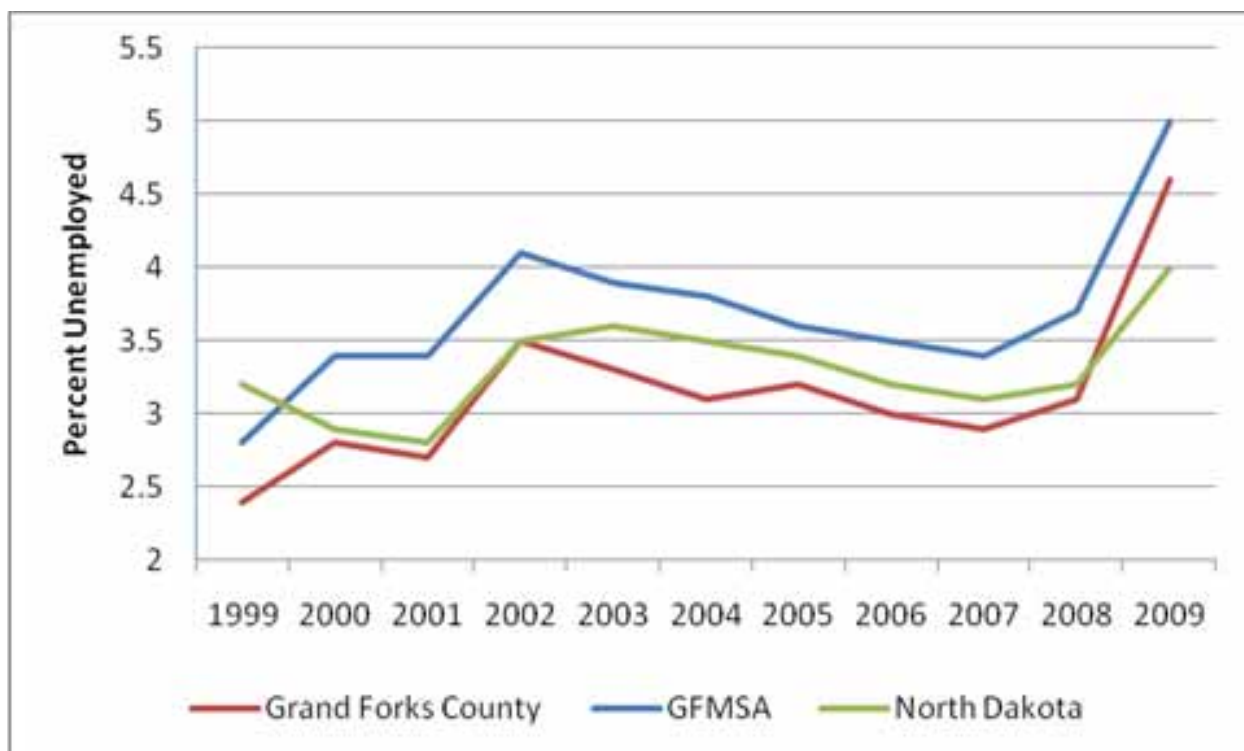
Table 3-9. Overview of Employment by Industry, 2000

Employment Types	ROI	Grand Forks County	GFMSA	North Dakota
Population 16 Years and Over in the Labor Force	8,115	52,229	76,520	502,306
Percentage of Employed Persons in Armed Forces	2.0%	4.3%	3.0%	1.4%
Agriculture, forestry, fishing and hunting, and mining	8.7%	2.4%	4.0%	8.2%
Construction	9.8%	7.3%	7.2%	6.2%
Manufacturing	7.4%	6.2%	7.2%	7.1%
Wholesale trade	3.7%	3.0%	2.9%	3.7%
Retail trade	10.5%	13.6%	13.1%	12.7%
Transportation and warehousing, and utilities	6.8%	5.0%	5.1%	5.7%
Information	1.4%	1.9%	1.9%	2.3%
Finance, insurance, real estate, and rental and leasing	3.8%	4.6%	4.3%	5.9%
Professional, scientific, management, administrative, and waste management services	6.0%	6.1%	5.5%	6.0%
Educational, health, and social services	25.7%	29.8%	29.4%	24.2%
Arts, entertainment, recreation, accommodation, and food services	7.0%	10.9%	9.6%	8.2%
Other services (except public administration)	5.0%	4.7%	5.2%	4.9%
Public administration	4.3%	4.5%	4.4%	4.8%

Source: USCB 2000

Unemployment in North Dakota is generally less than elsewhere in the United States. The unemployment rate for North Dakota did not exceed 5 percent during the 10-year period ending in August 2009 as compared to the United States unemployment level which has remained above 5 percent since 2001. Unemployment trends in Grand Forks County and GFMSA are similar to the North Dakota unemployment data (see **Figure 3-3**). From 1990 to 2008, the percentage unemployed is the annual unemployment rate, for 2009 the unemployment rate for August is used (USD L 2009).

Housing Characteristics. The U.S. Census Bureau reported that in 2008 there were 29,607 housing units in Grand Forks County; of these units 3,143 were vacant, resulting in a 10.6 percent vacancy rate. In the GFMSA there were 44,183 housing units, approximately 14,000 more than in Grand Forks County. The GFMSA had 5,484 units vacant, a 12.4 percent vacancy rate. Owner-occupied units in Grand Forks County totaled 14,819 units, or 56.0 percent of all occupied units, while 11,645 units or 44.0 percent were renter-occupied units. The homeowner vacancy rate in Grand Forks County was 3.1 percent and the rental vacancy rate was 8.0 percent. In the GFMSA, 23,946 units (61.9 percent) were owner-occupied and 14,753 units (38.1 percent) were renter-occupied. Homeowner vacancy rate for the GFMSA is 2.3 percent and the rental vacancy rate was 7.7 percent (USCB 2008b). Data for the census tracts that compose the ROI are not available between decennial censuses; therefore 2008 housing data are not available. According to the 2000 U.S. Census, the ROI had 4,432 housing units of which 450 were vacant, representing a 10.2 percent vacancy rate (USCB 2000).



Source: USDL 2009

Figure 3-3. Unemployment Percentages, 1999 to 2009

Grand Forks AFB. Grand Forks AFB is home to approximately 1,693 active-duty military members, with 999 military members living on-installation and 694 living off-installation. There are approximately 2,254 family members accompanying the active-duty military members. Of the 2,254 family members, 1,172 live on-installation and 1,082 live off-installation. The total number of personnel on Grand Forks AFB including federally employed civilians and contractors is approximately 4,919 (GFAFB 2008g, Vanderhoff 2010). Total payroll expenditures for Grand Forks AFB is \$130 million with the grand total economic impact equaling \$269 million.

Environmental Justice. For the purpose of the environmental justice analysis, the ROI from the socioeconomic discussion will be used for baseline conditions. Grand Forks AFB is 15 miles from the City of Grand Forks. Although Emerado City, a small population center just to the south of Grand Forks AFB, is in near proximity to the installation, U.S. Census data for this location might not capture all persons potentially affected by the projects at Grand Forks AFB; therefore, the ROI from the socioeconomic analysis will be used for the environmental justice analysis.

Minority population levels throughout the ROI tend to be slightly less than minority levels in Grand Forks County, GFMSA, and the State of North Dakota. The ROI's American Indian population was 1.3 percent, which is less than Grand Forks County (2.3 percent) and the State of North Dakota (4.9 percent). The Hispanic population in the ROI was slightly greater than the State of North Dakota (1.4 percent versus 1.2 percent), but less than GFMSA (1.4 percent versus 2.9 percent). The poverty status in the ROI for individuals and families was less than that of Grand Forks County, GFMSA, and the State of North Dakota (see **Table 3-10**) (USCB 2000).

Table 3-10. Minority, Low-income, and Poverty Status for 2000

Demographic	ROI	Grand Forks County	GFMSA	North Dakota
Total Population	10,695	66,109	97,478	642,200
Percent Male	52.2	50.9	50.5	49.9
Percent Female	47.8	40.1	49.5	50.1
Percent Under 5 Years	5.8	6.4	6.3	6.1
Percent Over 65 Years	11.2	9.6	12.2	14.7
Percent White	96.0	93.0	93.4	92.4
Percent Black or African American	0.7	1.4	1.0	0.6
Percent American Indian, Alaska Native	1.3	2.3	2.0	4.9
Percent Asian	0.5	1.0	0.8	0.6
Percent Native Hawaiian and Other Pacific Islander	0.0	0.1	0.1	0.0
Percent Some Other Race	0.5	0.7	1.3	0.4
Percent Reporting 2 or more races	1.0	1.6	1.5	1.2
Percent Hispanic or Latino ^a	1.4	2.1	2.9	1.2
Percent of Individuals Below Poverty ^b	6.9	12.3	11.9	11.9
Percent of Families Below Poverty	5.0	8.0	7.8	8.3
Per Capita Income ^c	\$17,990	\$17,868	\$17,679	\$17,769
Median Household Income ^c	\$41,763	\$35,785	\$35,562	\$34,604

Source: USCB 2000

Notes:

a. Persons of Hispanic or Latino origin can be of any race, and thus are also included in applicable race categories.

b. Based on 1999 poverty thresholds.

c. Per Capita Income and Median Household Income for the ROI consist of the average of all census tracts included in the ROI.

3.9 Infrastructure

3.9.1 Definition of the Resource

Infrastructure consists of the physical structures and systems that enable a population in a specified area to function. Infrastructure is wholly human-made, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as urban or developed. The availability of infrastructure and its capacity to support growth are generally regarded as essential to the economic growth of an area. The infrastructure information contained in this section provides a brief overview of each infrastructure component and comments on its existing general condition.

Solid waste management primarily deals with the availability of landfills to support a population's residential, commercial, and industrial needs. Alternative means of waste disposal might involve waste-to-energy programs or incineration. In some localities, landfills are designed specifically for, and are limited to, disposal of construction and demolition debris. Recycling programs for various waste categories (e.g., glass, metals, and papers) reduces reliance on landfills for disposal.

3.9.2 Existing Conditions

Airfield. Grand Forks AFB has one runway measuring 12,350 feet long. The runway was demolished and rebuilt in 2005. The airfield at Grand Forks AFB accounts for nearly 42 percent of the installation's total area. The 319 ARW is the primary tenant unit at Grand Forks AFB that utilizes the airfield. Transient aircraft, ranging from jet fighters to C-5 transports, use the airfield annually, accounting for approximately 18,000 landings and takeoffs per year at Grand Forks AFB. In the past, the 319 ARW predominantly used a fleet of KC-135 aircraft; however, the mission at Grand Forks AFB is being modified to operate Global Hawk and Predator Unmanned Aircraft Systems (USAF 2009).

Transportation. U.S. Highway 2 (US 2) serves as the primary access to the installation from Interstate (I) 29. County Highway 3 (CH 3) and Eielson Street provide access to the installation from US 2. I-29 is less than 10 miles east of the installation and the major north/south highway corridor along the North Dakota-Minnesota border.

There are two entrances to Grand Forks AFB. The primary entrance is the main gate which is open 24 hours per day and provides access to Steen Boulevard. The south gate, a secondary entrance that is open on a limited basis, connects US 2 to Eielson Street (USAF 2006).

The primary vehicular routes on the installation include Steen Boulevard, J Street, and Eielson Street. Steen Boulevard serves as the center of the installation's roadway system. It begins at the main installation entrance on CH 3 and ends at the flightline to the west. Four primary intersections along Steen Boulevard access two family housing entrances, commercial area access, and flightline operations access. Eielson Street provides north-south access to the installation. J Street runs parallel and west of CH 3 and provides a corridor for the east side of the installation.

Recent traffic engineering studies have evaluated the patterns along this corridor and aim to improve traffic flow through upgrades. The average volume during peak traffic hours at the J Street-Steen Boulevard intersection are as follows: 802 vehicles (0700 to 0800 hours), 482 vehicles (1200 to 1300 hours), and 993 vehicles (1600 to 1700 hours). Given that the average capacity for urban arterial roads is 1,500 vehicles per hour per lane, Grand Forks AFB has good traffic flow even during peak traffic periods, and the roadways adjacent to the installation are capable of accommodating peak traffic flow (USAF 2006, USAF and Gannett Fleming 2004).

Grand Forks AFB has a 6-mile multi-use trail system on the installation that connects housing areas to the rest of the installation. The trail facilitates the separation of pedestrians and vehicular traffic (USAF 2006).

Electrical. Electrical power is supplied to Grand Forks AFB by Nodak Electric Cooperative (NEC) and arrives via two 69-kilovolt feeders. The primary distribution system is 7,200/12,470 volts leaving the two main substations: (1) Steen substation and (2) Eielson substation. Nine feeder circuits in a loop radial arrangement distribute power at Grand Forks AFB. Ninety-nine percent of the transformers are loaded with less than 60 percent of their kilovolt-ampere rating, leaving sufficient electrical power available for future installation expansion (USAF 2006).

The majority of the electrical system consists of underground lines, which provide the highest system reliability. Emergency electrical power is supplied to critical facilities on the installation by emergency backup generators installed to support mission facilities, utility services, and contingency situations (USAF 2006).

Grand Forks AFB purchases a portion of their electricity from renewable sources through NEC. During FY 2007, a total of 3,324 megawatt hours of electricity from these sources were purchased (DOD 2008).

Central Heating and Cooling. The central heating plant was decommissioned in 2001 and individual heating systems composed of individual gas-fired boilers and infrared heat were installed throughout the installation under an Energy Savings Performance Contract (ESPC). The ESPC is a tool to implement energy conservation measures with an Energy Service Company, which finances, designs, implements, and monitors those measures. Grand Forks AFB entered into an ESPC contract with Honeywell, Inc., which has enabled the installation to install new, more efficient systems (USAF 2006).

Natural Gas. Natural gas is supplied to Grand Forks AFB by EXCEL Energy, a local distributing company. The installation is serviced by a 12-inch main that delivers natural gas to the metering station while an 8-inch main distributes natural gas from the main metering station. Natural gas is used for potable water generation and heating in installation facilities, and for heating in family housing. Ample natural gas capacity is available for future installation expansion (USAF 2006).

Liquid Fuel. There are three primary types of fuels that are stored and distributed at Grand Forks AFB. These include JP-8 (jet propellant-8) fuel, unleaded gasoline, and diesel. Although JP-8 was previously delivered through a government-owned pipeline that originated at the Defense Fuel Supply Center 14 miles east of the installation, all fuels are now delivered by trucks and the pipeline and Defense Fuel Supply Center are closed. JP-8 is stored in four aboveground storage tanks (ASTs), unleaded gasoline and diesel fuel are stored in a combination of ASTs and underground storage tanks (USTs) (USAF 2006).

Energy. Grand Forks AFB aims to meet the objectives of several laws requiring Federal agencies to become more energy independent over the next decade. Implementation of the proposed actions would meet the requirements of the Energy Policy Act of 2005, the Energy Independence and Security Act of 2008, and EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*; meet the objectives of the USAF Energy Security Plan; and allow Grand Forks AFB to begin to meet the DOD installation energy policy long-range goals for renewable energy use.

The Energy Policy Act of 2005 (P.L. 109-58), was signed by President Bush on August 8, 2005. It requires that by 2013 no less than 7.5 percent of the total amount of electric energy the Federal government consumes during any fiscal year shall be from renewable energy as is economically feasible and technically practicable (Section 203 [a] of EPA 2005 [42 U.S.C. 15852(a)]). Alternative renewable energy sources are being explored by Grand Forks AFB such as ground source heat pumps to help meet this Act's requirements. In addition, upgrades to outdated HVAC, lighting, and other utility systems would help improve overall energy demands.

The Proposed Action would also meet the requirements of EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (October 5, 2009), which establishes an integrated strategy towards sustainability in the Federal government and makes a reduction in GHG emissions a priority for the Federal agencies (see **Appendix A**). Under this Order, Federal agencies would establish and report a specific percentage reduction of GHG emissions using FY 2008 as the baseline.

Water Supply. Grand Forks AFB receives its potable water from the City of Grand Forks from the Red River. Agassiz Water Users, Inc., is a secondary source of potable water supply. There are three water mains that serve the installation: (1) a 14-inch water main from the City of Grand Forks, (2) an 8-inch main from Agassiz Water, and (3) an 8-inch main from the Grand Forks Traill Water District. Four elevated storage tanks provide a capacity of 1.9 million gallons of water for the installation. Grand Forks AFB's current water demand averages more than 356,164 gallons per day. There is sufficient water

supply available for future installation expansion and mission requirements at Grand Forks AFB (Dalrymple 2010).

Sanitary Sewer and Wastewater Systems. Grand Forks AFB's domestic sewage wastes are discharged to the sanitary sewer system and flow to treatment facilities via a system of gravity and force mains. Nine lift stations collect and transport sewage wastes to the treatment center, which is operated and located on installation property less than 1 mile east of the main installation. Four treatment cells (one primary, two secondary, and one tertiary) provide wastewater management to Grand Forks AFB. Grand Forks AFB has a series of lagoons 1 mile east of the installation to accommodate wastewater flows. Discharge from the lagoons flow south into the primary drainage basin along a drainage ditch. The lagoons have sufficient capacity for future installation expansion (USAF 2006).

Storm Water Systems. The storm water system at Grand Forks AFB consists of open channels, catch basins, and underground concrete pipes that guide storm water through unpaved ditches. Storm water leaves the installation through nine storm water outfalls including the southeast, northeast, northwest, and west ditches (Braun 2010).

Section 402(p) of the CWA states that storm water discharges associated with industrial activity to waters of the United States must be authorized by an NPDES permit. Grand Forks AFB currently operates under a North Dakota Pollutant Discharge Elimination System (NDPDES) Industrial Storm Water Permit (Permit No. NDR05-000). The permit authorizes the discharge of storm water associated with industrial activity to surface waters, in accordance with effluent limitations, monitoring requirements, and other conditions (NDDH 2004).

Communications. The Communications Squadron at Grand Forks AFB provides support to the 319 ARW and its associate units. The communications system on the installation consists of fiber optic cable between buildings and twisted pair copper cable for in-building conductivity. Manhole and conduit systems provide communications support for use on-installation through buried communication infrastructure. Service and infrastructure are available to support a wide range of communication requirements such as voice, data, video, wireless, land mobile radio, aircraft communications, and security systems.

Solid Waste Management. There are no active landfills on Grand Forks AFB. Municipal solid waste at Grand Forks AFB is managed by using an Integrated Solid Waste Management Plan. Most solid waste is disposed of through a contract with the Grand Forks Municipal Landfill (Permit No. 0347). The landfill has a permitted capacity until 2014 at the current rate of up to 350 tons of waste per day (NDDH 2009a). Located approximately 12 miles from the installation, the landfill receives municipal solid wastes transported by a contractor (GFAFB 2008b).

Construction contractors are required to remove all debris from projects. Solid municipal and asbestos waste debris would be disposed of at Grand Forks Municipal Landfill; and inert demolition debris would be disposed of at an approved location, such as Berger Landfill (Permit No. IT-198, expiration 2016) (Berger 2009). Hazardous wastes will be disposed of according to Grand Forks AFB Hazardous Waste Management Plan (GFAFB 2008c) (see **Section 3.9** for more information). The area landfills used for construction and demolition debris do not have any capacity concerns, and can readily handle the solid waste generated by the various projects.

Grand Forks AFB has a Qualified Recycling Program (QRP) and implements mandatory recycling of nonhazardous solid waste from military family housing, dormitories, industrial shops, offices, tenants, and contractors. Recyclable materials are collected and transported by a contractor to a facility

off-installation property. Solid waste generated at the installation has been reduced by more than 50 percent since 1992 because of the resource recovery and QRP and Pollution Prevention (P2) Program.

Land Treatment Facility (LTF). The LTF is operated on the southwestern portion of the installation to remediate soils contaminated with petroleum. Petroleum-contaminated soils could be generated on-installation through spills, and are encountered during excavating activities or while replacing or removing USTs and associated piping (USAF 2008f). Nine monitoring wells are in place at the land treatment facility. The land treatment facility is permitted by the NDDH (GFAFB 2007a).

Pollution Prevention. AFI 32-7080, *Pollution Prevention Program*, implements the regulatory mandates specified in the Emergency Planning and Community Right-to-Know Act of 1990; EO 12873, *Federal Acquisition, Recycling, and Waste Prevention*; and EO 12902, *Energy Efficiency and Water Conservation at Federal Facilities*. AFI 32-7080 prescribes the establishment of Pollution Prevention Management Plans, which have management and minimization strategies for ozone-depleting substances, USEPA-17 industrial toxic pollutants, hazardous wastes, municipal solid wastes, affirmative procurement of environmentally friendly products, energy conservation, and air and water pollutant reduction. Grand Forks AFB's P2 program attempts to reduce air, land, surface water, and groundwater pollution at the installation. The 319 ARW fulfills this requirement with the following plans:

- Solid Waste Management Plan (GFAFB 2008b)
- Storm Water Pollution Prevention Plan (SWPPP) (GFAFB 2001)
- Hazardous Waste Management Plan (GFAFB 2008c)
- Spill Prevention Control and Countermeasures Plan (GFAFB 2009b).

These plans ensure that Grand Forks AFB maintains a waste reduction program and meets the requirements of the CWA; the NPDES permit program; and Federal, state, and local requirements for spill prevention control and countermeasures.

3.10 Hazardous Materials and Waste

3.10.1 Definition of the Resource

Hazardous materials are defined by 49 CFR 171.8 as “hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (49 CFR 172.101), and materials that meet the defining criteria for hazard classes and divisions” in 49 CFR Part 173. Transportation of hazardous materials is regulated by the U.S. Department of Transportation regulations within 49 CFR Parts 105–180.

Hazardous wastes are defined by the Resource Conservation and Recovery Act (RCRA) at 42 U.S.C. 6903(5), as amended by the Hazardous and Solid Waste Amendments, as “a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.” Certain types of hazardous wastes are subject to special management provisions intended to ease the management burden and facilitate the recycling of such materials. These are called universal wastes and their associated regulatory requirements are specified in 40 CFR Part 273. Four types of waste are currently covered under the universal waste regulations: hazardous waste batteries, hazardous waste pesticides that are either recalled or collected in waste pesticide collection programs, hazardous waste thermostats, and hazardous waste lamps.

Special hazards are those substances that might pose a risk to human health and are addressed separately from other hazardous substances. Special hazards include asbestos-containing material (ACM), polychlorinated biphenyls (PCBs), and lead-based paint (LBP). The USEPA is given authority to regulate these special hazard substances by the Toxic Substances Control Act (TSCA) Title 15 U.S.C. Chapter 53. TSCA Subchapter I identifies PCBs, Subchapter II handles ACMs, and Subchapter IV discusses LBP. USEPA has established regulations regarding asbestos abatement and worker safety under 40 CFR Part 763 with additional regulation concerning emissions (40 CFR Part 61). Whether from lead abatement or other activities, depending on the quantity or concentration, the disposal of the LBP waste is potentially regulated by the RCRA at 40 CFR Part 260. The disposal of PCBs is addressed in 40 CFR Parts 750 and 761. The presence of special hazards or controls over them might affect, or be affected by, a proposed action. Information on special hazards describing their locations, quantities, and condition assists in determining the significance of a proposed action.

The DOD has developed the ERP, which facilitates environmentally responsible land management thorough investigation and cleanup of contaminated sites on military installations. Through the ERP, DOD evaluates and cleans up sites where hazardous wastes have been spilled or released to the environment. Description of ERP activities provides a useful gauge of the condition of soils, water resources, and other resources that might be affected by contaminants. It also aids in identification of properties and their usefulness for given purposes (e.g., activities dependent on groundwater usage might be restricted until remediation of a groundwater contaminant plume has been completed).

For the USAF, AFI 32-70, *Environmental Quality*, and the AFI 32-7000 series incorporate the requirements of all Federal regulations, and other AFIs and DOD Directives for the management of hazardous materials, hazardous wastes, and special hazards. Evaluation extends to generation, storage, transportation, and disposal of hazardous wastes when such activity occurs at or near the project site of the Proposed Action.

3.10.2 Existing Conditions

Hazardous Materials. AFI 32-7086, *Hazardous Materials Management*, establishes procedures and standards that govern management of hazardous materials throughout the USAF. It applies to all USAF personnel who authorize, procure, issue, use, or dispose of hazardous materials, and to those who manage, monitor, or track any of those activities. Under AFI 32-7086, the USAF has established roles, responsibilities, and requirements for a hazardous material management program (HMMP). The purpose of the HMMP is to control the procurement and use of hazardous material to support USAF missions, ensure the safety and health of personnel and surrounding communities, and minimize USAF dependence on hazardous materials. The HMMP includes the activities and infrastructure required for ongoing identification, management, tracking, and minimization of hazardous materials.

Hazardous materials and petroleum products such as fuels, flammable solvents, paints, corrosives, pesticides, and cleaners are used throughout Grand Forks AFB for various functions including aircraft maintenance, aircraft ground equipment maintenance, ground vehicle maintenance, and facilities maintenance (CBP 2008). Hazardous materials are managed and used through each central supply location with oversight by HMMP representatives. Unused hazardous materials are offered for free issue and maintained by the hazardous waste accumulation site (HWAS) contractor located at the south end of Base Supply (Building 408). The 319th Mission Support Group (319 MSG/LGRF) is responsible for receiving, storing, and issuing the majority of the fuel at Grand Forks AFB. The primary areas under 319 MSG/LGRF's supervision include the Petroleum, Oils, and Lubricants (POL) Bulk Fuel Storage Facility; two aircraft hydrant fueling systems (Type II and Type III); and a military vehicle fueling station. The Bulk Fuel Storage Facility is near the south side of the installation and is the receiving point for JP-8 fuel. The following facilities use tanks to store gasoline, diesel fuel, used motor oil, or JP-8:

General Services, the Electrical Power Production Shop, Aerospace Ground Equipment Flight Maintenance Shop, Army and Air Force Exchange Service, and Operations Flight Infrastructure Electrical (GFAFB 2003b).

Hazardous Wastes. The 319 ARW maintains a Hazardous Waste Management Plan (GFAFB 2008c) as directed by AFI 32-7042, *Waste Management*. This plan prescribes the roles and responsibilities of all members of Grand Forks AFB with respect to the waste stream inventory, waste analysis plan, hazardous waste management procedures, training, emergency response, and pollution prevention. The plan establishes procedures to comply with applicable Federal, state, and local standards for solid waste and hazardous waste management.

Grand Forks AFB does not maintain a permitted hazardous waste storage facility. Wastes are stored in containers and can be accumulated for up to 180 days at the HWAS at the south end of Base Supply (Building 408) (GFAFB 2008g). The Hazardous Waste Stream Inventory is maintained through an Access Database and is part of the Grand Forks AFB Hazardous Waste Analysis and Sampling Plan (GFAFB 2008c).

Grand Forks AFB is a small-quantity generator (SQG) of hazardous waste (Handler Identification ND3571924759). Hazardous waste generated at Grand Forks AFB includes bead blast media, fuels, spent solvents, paint, stripping chemicals, oils, batteries shelf-life expired materials, contaminated soil, and spill residue (CBP 2008). Aircraft maintenance facilities are the largest generators of hazardous waste at the installation, accounting for approximately 90 percent of hazardous waste (GFAFB 2003a). Grand Forks AFB maintains a HWAS, 13 hazardous waste satellite accumulation points (SAPs), and 7 nonhazardous waste SAPs (GFAFB 2008c).

Petroleum, Oils, and Lubricants. AFI 32-7044, *Storage Tank Compliance*, implements AFD 32-70. It identifies compliance requirements for USTs, ASTs, and associated piping that store petroleum products and hazardous substances. USTs are subject to regulation under RCRA, 42 U.S.C. 6901, and 40 CFR 280. An inventory of ASTs and USTs is maintained at Grand Forks AFB and includes the location, contents, capacity, containment measures, status, and installation dates.

Grand Forks AFB currently stores JP-8 in ASTs at two bulk storage facilities (total capacity of 3.2 million gallons). There are nine USTs near the flight line that contain JP-8 and have capacities that range from 3,000, to 40,000 gallons (total capacity 73,000 gallons). In addition, there are two 4,000-gallon underground product recovery tanks at Pump Houses 651 and 658, and two 2,500-gallon underground product recovery tanks at Pump Houses 501 and 511. Four R-11 fuel delivery trucks, each with a capacity of 6,000 gallons, are used to fuel aircraft. The main bulk storage facility is near the southern side of the installation and is the receiving point for JP-8 fuel. There are two ASTs at the main bulk storage facility, which are used to supply fuel to the ramp along the flight line and the second bulk storage facility. JP-8 is transferred across the installation through underground pipelines. The second bulk storage facility (Facility No. 664) is on the western side of the installation and uses two ASTs to supply fuel to the C Ramp (GFAFB 2003b). In addition to JP-8, USTs on the installation also contain gasoline, diesel fuel, used oil, E85 (ethanol fuel), and hydraulic oil.

Other organizations on Grand Forks AFB store motor gasoline, diesel fuel, and used motor oil in various storage tanks, including the General Services, Electrical Power Production Shop, Aerospace Ground Equipment Flight Maintenance Shop, Army and Air Force Exchange Service, and Operations Flight Infrastructure Electrical (GFAFB 2003b). Gasoline is contained in two 10,000-gallon USTs near the Shopette (Building 240) and in one 20,000-gallon UST at the Government-owned vehicle filling station (Building 454). Diesel fuel is contained in four USTs with capacities ranging from 550 to 15,000 gallons at Buildings 454, 528, 607, and 664. The total UST capacity for diesel fuel is 22,550 gallons. Used oil is

contained within 6 USTs with capacities ranging from 500 to 9,000 gallons, with a total capacity of 21,500 gallons. USTs containing used oil are associated with Buildings 314, 580, 605, 649, 661, and 737. E85 is contained in one 10,000-gallon UST at Building 454, and hydraulic oil is contained in one 1,000-gallon UST at Building 556 (Braun 2010).

There are several USTs at Grand Forks AFB that were previously used to store heating oil for heating facilities; however, these USTs are no longer in use or refilled and are in temporary closure, as natural gas has been extended throughout the installation. There are also numerous diesel-powered generators at Grand Forks AFB that are used to supply electricity during electrical emergencies. Diesel fuel for these generators is stored in USTs, ASTs, or in tanks found within the generator units (GFAFB 2003b).

Runway and Aircraft Deicer. Runway deicers (potassium acetate) and aircraft deicers (propylene glycol) are contained in ASTs at Grand Forks AFB. Two 10,000-gallon ASTs associated with Building 555 contain potassium acetate. Propylene glycol is contained in three ASTs associated with Buildings 402 (one AST with a capacity of 26,000 gallons) and Building 600 (two ASTs with capacities of 19,730 gallons each). Type IV aircraft deicer is contained in an 8,600-gallon AST associated with Building 402 (Braun 2010).

Asbestos-Containing Material. Asbestos is regulated by the USEPA under the CAA; TSCA; and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); North Dakota Administrative Code 33-15-13, *Emission Standards for Hazardous Air Pollutants*; and Century Code 23, *Health and Safety Chapter 25 Air Pollution Control*. The USEPA has established that any material containing more than 1 percent asbestos by weight is considered an ACM. Friable ACM is any material containing more than 1 percent asbestos, and that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. Nonfriable ACM is any ACM that does not meet the criteria for friable ACM. North Dakota has its own program and guidelines to manage ACM. The NDDH is responsible for overseeing compliance with the requirements of the ACM program.

Building materials in older buildings are assumed to contain asbestos. It exists in a variety of forms and can include siding, ceiling tiles, floor tiles, floor tile mastic, roofing materials, joint compound, wallboard, thermal system insulation, boiler gaskets, paint, and other materials. If asbestos is disturbed, fibers can become friable. Common sense measures, such as avoiding damage to walls and pipe insulation, will help keep the fibers from becoming airborne.

AFI 32-1052, *Facilities Asbestos Management*, provides the direction for asbestos management at USAF installations. It requires installations to develop an asbestos management plan for the purpose of maintaining a permanent record of the status and condition of ACM in installation facilities, and to document asbestos management efforts. In addition, the instruction requires installations to develop an asbestos operating plan detailing how the installation accomplishes asbestos-related projects.

Grand Forks AFB maintains an *Asbestos Management Plan* and an *Asbestos Operating Plan* that document policies and procedures for managing ACMs at Grand Forks AFB and specify responsibilities and requirements for identifying, assessing, and maintaining ACMs. Asbestos concerns are managed by the 319 CES/CEA (GFAFB 2008g).

In general, ACM is removed on an as-needed basis at Grand Forks AFB to minimize health risks from release of asbestos fibers during normal activities, maintenance, renovation, or demolition.

Lead-Based Paint. Lead is a heavy, ductile metal commonly found simply as metallic lead or in association with organic compounds, oxides, and salts. It was commonly used in house paint for several years. The Federal government banned the use of most LBP in 1978. Therefore, it is assumed that all

structures constructed prior to 1978 could contain LBP. Paint chips that fall from the exterior of buildings can potentially contaminate the soil if the paint contains lead. The USEPA has established recommendations for maximum lead soil contamination levels. No action is required if the lead concentration is less than 400 ppm in areas expected to be used by children, or less than 2,000 ppm in areas where contact by children is less likely. Soil abatement and public notice are recommended when lead levels exceed 5,000 ppm (GFAFB 2003c).

The Residential Lead-Based Paint Hazard Reduction Act of 1992, Subtitle B, Section 408 (commonly called Title X) regulates the use and disposal of LBP on Federal facilities. Federal agencies are required to comply with applicable Federal, state, and local laws relating to LBP activities and hazards. The State of North Dakota regulates LBP under State Rule 33-15-24, *Standards for Lead-Based Paint Activities*. The NDDH is responsible for overseeing compliance with the requirements of the LBP program. The *Grand Forks AFB Lead-Based Paint Management Plan* outlines a plan for carrying out activities required to implement the LBP management objectives and provides an overview of ongoing LBP activities and procedures (GFAFB 2003c).

Polychlorinated Biphenyls. PCBs are a group of chemical mixtures used as insulators in electrical equipment such as transformers and fluorescent light ballasts. Federal regulations govern items containing 50 to 499 ppm PCBs. PCBs are managed and regulated in accordance with the USEPA's TSCA of 1976. Regulations are found in 40 CFR 761.

Chemicals classified as PCBs were widely manufactured and used in the United States throughout the 1950s and 1960s. PCB-containing oil is typically found in older electrical transformers and light fixtures (ballasts). Transformers containing greater than 500 ppm PCBs, between 50 and 500 ppm PCBs, and less than 50 ppm PCB are considered PCB, PCB-contaminated, and non-PCB, respectively.

All major equipment, components, and transformers with PCB concentrations of 50 ppm or greater have been removed from service or are refilled with non-PCB oils at Grand Forks AFB. Grand Forks AFB treats all ballasts and transformers that are not labeled PCB-free or missing date-of-manufacture labels as containing PCB (GFAFB 2003a).

Pesticides. Pest management practices at Grand Forks AFB are covered in the Pest Management Plan. Herbicides are applied in improved areas at Grand Forks AFB to control dandelions. Aerial spraying is conducted over the entire installation to control mosquitoes. Pesticide use at the installation is primarily for mosquito control, accomplished through installationwide aerial spraying of Altosid™ larvicide and Trumpet™ adulticide. Certified personnel from the 319 CES Entomology Flight and a grounds maintenance contractor perform the application (GFAFB 2008b). Military public health maintains records on all pesticide applicators (CBP 2008). Grand Forks AFB has a noxious weed inventory and control plan that identifies several species of noxious weeds, such as Canada thistle, perennial sow thistle, absinth wormwood, spotted knapweed, bull thistle, and leafy spurge. EO 13112, North Dakota Law 63-01.1-01, and P.L. 93-629 require landowners to eradicate or control the spread of noxious weeds. The herbicide Tordon 22K is recommended by the plan to eradicate these species. The installation's grounds maintenance contractor uses Roundup and 2, 4-dichlorophenoxyacetic acid (2, 4-D) for weed killing. The herbicide 2, 4-D is widely used to kill unwanted broad-leaf plants. Roundup contains glyphosate and isopropyl amine salt, and is a popular, effective herbicide. Mixing of herbicides occurs at the grounds maintenance contractor's off-installation location and then they are transported on-installation for application. The pesticide chlordane has not historically been used on Grand Forks AFB (GFAFB 2007f). No additional pesticide or herbicide application other than residential applications on a case-by-case basis is carried out at Grand Forks AFB (USAF 2008f).

All pesticides used on the installation are USEPA- or state-registered. Nonstandard pesticides are managed by the Pest Management Coordinator. Pesticide spills are remediated in accordance with the Spill Prevention, Control, and Countermeasures (SPCC) Plan and Installation Spill Control Plan (GFAFB 2007e).

Radon. Radon is a naturally occurring radioactive gas found in soils and rocks. It comes from the natural breakdown or decay of uranium. Radon has the tendency to accumulate in enclosed spaces that are usually below ground and poorly ventilated (e.g., basements). Radon is an odorless, colorless gas that has been determined to increase the risk of developing lung cancer. In general, the risk increases as the level of radon and length of exposure increase.

The USEPA has established a guidance radon level of 4 picocuries per liter (pCi/L) in indoor air for residences; however, there have been no standards established for commercial structures. Radon gas accumulation greater than 4 pCi/L is considered to represent a health risk to occupants. Grand Forks County is listed in Zone 1 for radon. In Zone 1 areas, the predicted average indoor radon screening level is above the USEPA radon guideline of 4 pCi/L (USEPA 2009a). All facilities on Grand Forks AFB are required to be tested for radon, and if levels approach or exceed 4 pCi/L, proper equipment is installed to reduce exposure levels below a level of insignificance.

Environmental Restoration Program. The Defense Environmental Restoration Program (DERP) was formally established by Congress in 1986 to provide for the cleanup of DOD property at active installations, Base Realignment and Closure installations, and formerly used defense sites throughout the United States and its territories. The two restoration programs under the DERP are the ERP and Military Munitions Response Program (MMRP). The ERP requires each installation to identify, investigate, and clean up contaminated sites. The MMRP addresses nonoperational military ranges and other sites that are suspected or known to contain unexploded ordnance, discarded military munitions, or munitions constituents. Eligible DERP sites include those contaminated by past defense activities that require cleanup under CERCLA, as amended by Superfund Amendment and Reauthorization Act, and certain corrective actions required by RCRA. Non-DERP sites are remediated under the Compliance-Related Cleanup Program.

Grand Forks AFB has seven ERP sites and two Areas of Concern (AOCs) that consist of historic landfills, fire training areas, past equipment maintenance activity areas, gasoline stations, and the bulk POL transfer area (GFAFB undated). **Table 3-11** lists the ERP sites and AOCs and their current statuses. There are no known or suspected MMRP sites at Grand Forks AFB. A total of 48 suspected AOCs were added to the ERP list by the NDDH in September 1993. These additional AOCs were grouped with the ERP sites into 20 Solid Waste Management Units (SWMUs). The SWMUs are subject to RCRA Corrective Action and are regulated by Grand Forks AFB RCRA Corrective Action permits. Primary contaminants in soils and sediments include elevated levels of VOCs, semivolatile organic compounds, polycyclic aromatic hydrocarbons, and total petroleum hydrocarbons. Primary contaminants in groundwater include fuels and solvents (USAF 2008a). The locations of ERP sites at Grand Forks AFB are shown in **Figure 3.4**. In addition to ERP sites, several monitoring wells are in place to monitor groundwater quality. The site of a demolished Army and Air Force Exchange Service gas station and vehicle maintenance bays (Former Building 200) that currently has eight monitoring wells to test for the presence of gasoline and other chemical parameters. USTs and utility lines have been removed. Soil vapor and groundwater are currently monitored for contamination.

Table 3-11 ERP Sites and AOC at Grand Forks AFB

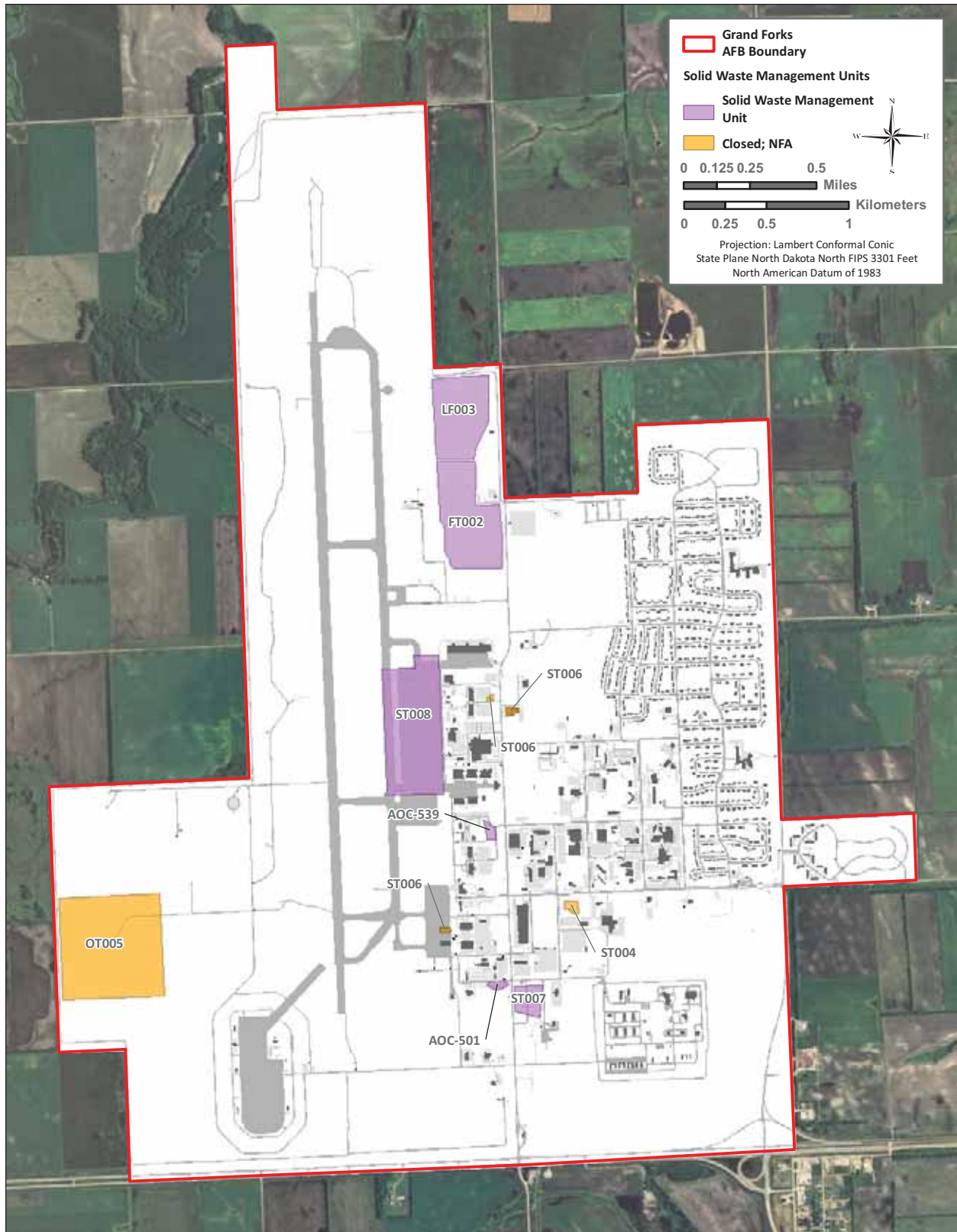
Site Number	Site Name	Site Description	Status
FT-02	Fire Training Area/Old Sanitary Landfill Area	This site was part of a historic sanitary landfill, approximately 5 acres in size. Petroleum fuels were sprayed over the landfill and ignited for training. The landfill was capped in 1997. A UST was also within the site. It was backfilled in place in 1981.	LTM
LF-03	New Sanitary Landfill Area	A landfill area north of ERP Site FT-02 in the northern portion of the installation. The landfill was for general use until 1985. Currently, the landfill is used for construction debris.	LTM
ST-04	Strategic Air Ground Equipment (Building 306)	Former refueling station and maintenance facility. USTs were utilized at this site up to the late 1970s, and in 1988 and 1992 the USTs were closed and removed, respectively.	Closed; NFA
OT-05	Explosive Ordnance Detonation Area	Explosive ordnance detonation area that was active from 1966 to 1993. It was approximately 90 acres in size and in the southwestern portion of the installation.	Closed; NFA
ST-06	Refueling Ramps and Pads, Base Tanks Area	Installationwide UST removal, which included 14 USTs.	Closed; NFA
ST-07	POL Off-Loading Area	POL unloading area approximately 0.65 acres in size surrounding the unloading header. The area was exposed to spills and leaks from the handling and transfer of POLs.	LTM
ST-08	Refueling Ramps and Pads	Refueling ramps and pads area that was exposed to spills and leaks from the refueling of aircraft.	LTM
AOC-1	Pole yard	Pole yard located east of ST007 that was used for the storage of electrical infrastructure including utility poles, transformers, and utility lines.	NFA
AOC-501	Former Pump House 501	JP-4, diesel, and gasoline leaking from utility lines. Groundwater and media monitoring.	LTM
AOC 539	Former Pump House 539	Area of a demolished jet engine test cell and trichloroethylene solvent spill. Groundwater and media monitoring.	LTM

Source: USAF 2008a, GFAFB undated

Key:

NFA = No Further Action

LTM = Long-Term Monitoring



Sources: ERP Sites: Grand Forks AFB 2008; Aerial Photo: ArcGIS Microsoft Virtual Earth Premium Online Service, 2009.

Figure 3-4. SWMUs at Grand Forks AFB

3.11 Safety

3.11.1 Definition of the Resource

A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. Human health and safety addresses both workers' health and public safety during demolition activities and facilities construction, and during subsequent operations of those facilities.

Construction site safety is largely a matter of adherence to regulatory requirements imposed for the benefit of employees and implementation of operational practices that reduce risks of illness, injury, death, and property damage. The health and safety of onsite military and civilian workers are safeguarded by numerous DOD and USAF regulations designed to comply with standards issued by Occupational Safety and Health Administration (OSHA) and USEPA. These standards specify the amount and type of training required for industrial workers, the use of protective equipment and clothing, engineering controls, and maximum exposure limits for workplace stressors.

Safety and accident hazards can often be identified and reduced or eliminated. Necessary elements for an accident-prone situation or environment include the presence of the hazard itself together with the exposed (and possibly susceptible) population. The degree of exposure depends primarily on the proximity of the hazard to the population. Activities that can be hazardous include transportation, maintenance and repair activities, and the creation of extremely noisy environments. The proper operation, maintenance, and repair of vehicles and equipment carry important safety implications. Any facility or human-use area with potential explosive or other rapid oxidation process creates unsafe environments for nearby populations. Extremely noisy environments can also mask verbal or mechanical warning signals such as sirens, bells, or horns.

AFI 91-301, Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program, implements AFD 91-3, Occupational Safety and Health, by outlining the AFOSH Program. The purpose of the AFOSH Program is to minimize loss of USAF resources and to protect USAF personnel from occupational deaths, injuries, or illnesses by managing risks. In conjunction with the USAF Mishap Prevention Program, these standards ensure all USAF workplaces meet Federal safety and health requirements. This instruction applies to all USAF activities.

3.11.2 Existing Conditions

Construction Safety. All contractors performing construction activities are responsible for following ground safety regulations and workers compensation programs and are required to conduct construction activities in a manner that does not pose any risk to workers or personnel. Industrial hygiene programs address exposure to hazardous materials, use of personal protective equipment, and availability of Material Safety Data Sheets (MSDS). Industrial hygiene is the responsibility of contractors, as applicable. Contractor responsibilities are to review potentially hazardous workplace operation; to monitor exposure to workplace chemicals (e.g., asbestos, lead, hazardous material), physical hazards (e.g., noise propagation), and biological agents (e.g., infectious waste); to recommend and evaluate controls (e.g., ventilation, respirators) to ensure personnel are properly protected or unexposed; and to ensure a medical surveillance program is in place to perform occupational health physicals for those workers subject to any accidental chemical exposures.

Explosives and Munitions Safety. Explosive safety clearance zones must be established around facilities used for the storage, handling, or maintenance of munitions. Air Force Manual 91-201 establishes the size of the clearance zone based upon QD criteria or the category and weight of the explosives contained within the facility. QD arcs on Grand Forks AFB are mostly located in the southeastern portion of the installation and the northeastern side of the airfield. At Grand Forks AFB, there are QD arcs associated with the munitions storage area and the hazardous cargo parking pad. **Figure 2-2** shows the locations of the QD arcs at Grand Forks AFB.

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4. Environmental Consequences

This section contains four subsections. **Section 4.1** provides a general introduction to the environmental consequences analysis, including significance criteria for each resource area. **Section 4.2** presents the No Action Alternative, which is prescribed by CEQ regulations. **Section 4.3** provides a general analysis of the environmental consequences by resource area. **Section 4.4** provides the detailed analysis of the Proposed Action, as presented in **Section 2.1**. Potential cumulative effects that could occur as a result of implementing the Proposed Action and other past, present, and reasonably foreseeable projects are discussed in **Section 5**.

4.1 Introduction

The intention of **Section 4** of the EA is to present both a general analysis of the environmental effects of installation development activities (see **Section 4.3**), and a summary of site-specific environmental effects of individual installation development projects (see **Section 4.4**). The general analysis identifies the general environmental effects on each resource area associated with the ongoing construction and infrastructure upgrade activities, with a focus on avoiding those areas that are constraints to development. However, a general analysis of potential development activities alone does not provide the framework to assess adequately the potential environmental consequences of a single proposed project. Therefore, **Section 4.4** presents a detailed analysis of the representative demolition, construction, and infrastructure projects introduced in **Section 2.1**, to provide a range of potential consequences that could be expected from implementing the proposed projects with the greatest potential for adverse environmental effects. The representative projects were selected for detailed analysis because they are large in scale or have a unique aspect (e.g., proposed location or operational characteristics) with the potential to result in adverse environmental effects. In addition, **Section 4.4** contains a summary in tabular form of the environmental impacts associated with all projects identified for Grand Forks AFB (also see **Tables 2-1, 2-2, and 2-3**). The analysis presented in **Sections 4.3 and 4.4** provides the basis for the cumulative effects analysis in **Section 5**. The No Action Alternative is presented in **Section 4.2** before the Proposed Action in order to provide a comparison of the potential environmental consequences of implementing the Proposed Action against taking no action.

The specific criteria for evaluating the potential environmental effects of the No Action Alternative or the Proposed Action are described in the following text, identified by resource area. The significance of an action is also measured in terms of its context and intensity. The context and intensity of potential environmental effects are described in terms of duration, whether they are direct or indirect, the magnitude of the impact, and whether they are adverse or beneficial, as summarized below:

- **Short-term or long-term.** In general, short-term effects are those that would occur only with respect to a particular activity, for a finite period, or only during the time required for construction or installation activities. Long-term effects are those that are more likely to be persistent and chronic.
- **Direct or indirect.** A direct effect is caused by an action and occurs around the same time at or near the location of the action. An indirect effect is caused by an action and might occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action.
- **Negligible, minor, moderate, or significant.** These relative terms are used to characterize the magnitude or intensity of an impact. Negligible impacts are generally those that might be perceptible but are at the lower level of detection. A minor effect is slight, but detectable. A moderate effect is readily apparent. Significant effects are those that, in their context and due

to their magnitude (severity), have the potential to meet the thresholds for significance set forth in CEQ regulations (40 CFR 1508.27) and, thus, warrant heightened attention and examination for potential means for mitigation to fulfill the policies set forth in NEPA. Significance criteria by resource area are presented in the following text.

- **Adverse or beneficial.** An adverse effect is one having unfavorable or undesirable outcomes on the man-made or natural environment. A beneficial effect is one having positive outcomes on the man-made or natural environment.

The following text presents the criteria that would constitute a significant environmental effect resulting from implementation of the No Action Alternative (see **Section 5.2**), or the Proposed Action. The same significance criteria are also applied to potential cumulative effects (see **Section 6**) of implementing the Proposed Action in conjunction with past, present, or reasonably foreseeable future actions.

Noise Evaluation Criteria

Potential changes in the noise environment can be beneficial (i.e., if they reduce the number of sensitive receptors exposed to unacceptable noise levels), negligible (i.e., if the total area exposed to unacceptable noise levels is essentially unchanged), or adverse (i.e., if they result in increased noise exposure to unacceptable noise levels). Projected noise effects are evaluated quantitatively and qualitatively. A proposed action could have a significant effect with respect to noise if the following were to occur:

- Noise-sensitive areas experience an increase in noise exposures at or above a DNL of 65 dBA when compared to the baseline levels.

Land Use Evaluation Criteria

The significance of potential land use effects is based on the level of land use sensitivity in areas affected by a proposed action and compatibility of proposed actions with existing conditions. A proposed action could have a significant effect with respect to land use if any the following were to occur:

- Be inconsistent or in noncompliance with existing land use plans or policies
- Preclude the viability of existing land use
- Preclude continued use or occupation of an area
- Be incompatible with adjacent land use to the extent that public health or safety is threatened
- Conflict with planning criteria established to ensure the safety and protection of human life and property.

Air Quality Evaluation Criteria

The environmental consequences to local and regional air quality conditions near a proposed Federal action are determined based upon the increases in regulated pollutant emissions relative to existing conditions and ambient air quality. Specifically, the impact in NAAQS “attainment” areas would be considered significant if the net increases in pollutant emissions from the Federal action would result in any one of the following scenarios:

- Cause or contribute to a violation of any national or state ambient air quality standard
- Expose sensitive receptors to substantially increased pollutant concentrations

- Represent an increase of 10 percent or more in an affected AQCR emissions inventory
- Exceed any Evaluation Criteria established by a SIP or permit limitations.

Geological Resources Evaluation Criteria

Protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating potential effects of a proposed action on geological resources. Generally, adverse effects can be avoided or minimized if proper construction techniques, erosion-control measures, and structural engineering design are incorporated into project development. A proposed action could have a significant effect with respect to geological resources if any the following were to occur:

- Alteration of the lithology, stratigraphy, and geological structure that control groundwater quality, distribution of aquifers and confining beds, and groundwater availability
- Changes to the soil composition, structure, or function within the environment.

Water Resources Evaluation Criteria

Evaluation criteria for effects on water resources are based on water availability, quality, and use; existence of floodplains; and associated regulations. A proposed action could have a significant effect with respect to water resources if any the following were to occur:

- Substantially reduce water availability or supply to existing users
- Overdraft groundwater basins
- Exceed safe annual yield of water supply sources
- Substantially affect water quality adversely
- Endanger public health by creating or worsening health hazard conditions
- Threaten or damage unique hydrologic characteristics
- Violate established laws or regulations adopted to protect water resources.

The potential effect of flood hazards on a proposed action is important if such an action occurs in an area with a high probability of flooding.

Biological Resources Evaluation Criteria

The significance of effects on biological resources is based on the following:

- The importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource
- The proportion of the resource that would be affected relative to its occurrence in the region
- The sensitivity of the resource to proposed activities
- The duration of ecological ramifications
- The “taking” of threatened or endangered species
- Jeopardizing threatened or endangered species habitat.

Effects on biological resources would be significant if species or habitats of high concern are adversely affected over relatively large areas. Effects would also be considered significant if disturbances cause reductions in population size or distribution of a species of high concern.

Ground disturbance and noise associated with construction can directly or indirectly cause adverse effects on biological resources. Direct effects from ground disturbance are evaluated by identifying the types and locations of potential ground-disturbing activities in correlation to important biological resources. Habitat removal and damage or degradation of habitats might be adverse effects associated with ground-disturbing activities.

Cultural Resources Evaluation Criteria

Under Section 106 of the NHPA, adverse effects on historic properties can include any of the following:

- Physically altering, damaging, or destroying all or part of a resource
- Altering characteristics of the surrounding environment that contribute to the resource's significance
- Introducing visual or audible elements that are out of character with the property or that alter its setting
- Neglecting the resource to the extent that it deteriorates or is destroyed
- The sale, transfer, or lease of the property out of agency ownership (or control) without adequate legally enforceable restrictions or conditions to ensure preservation of the property's historic significance.

For the analysis of effects of the Proposed Action on archaeological resources, the APE includes both direct impacts from ground-disturbing activity, and indirect impacts resulting from undertakings outside of sites locations. Impacts on cultural resources includes potential effects on buildings, sites, structures, districts, and objects eligible for or included in the NRHP; cultural items as defined in the NAGPRA; archaeological resources as defined by the Archaeological Resources Protection Act of 1979 (ARPA); and archaeological artifact collections and associated records as defined by 36 CFR part 79.

Under NEPA, impacts on cultural resources are assessed as short-term or long-term; direct or indirect; and minor, moderate, or significant. Under Section 106 of the NHPA, the Proposed Action might have no effect, no adverse effect, or an adverse effect on historic properties.

Socioeconomics and Environmental Justice Evaluation Criteria

Construction expenditures are assessed in terms of direct effects on the local economy and related effects on other socioeconomic resources (e.g., housing). The magnitude of potential impacts can vary greatly, depending on the location of a proposed action. For example, implementation of an action that creates ten employment positions might go unnoticed in an urban area, but could have considerable impacts in a rural region. If potential socioeconomic changes were to result in substantial shifts in population trends or a decrease in regional spending or earning patterns, those effects would be considered adverse. A proposed action could have a significant effect with respect to the socioeconomic conditions in the surrounding ROI if the following were to occur:

- Change the local business volume, employment, personal income, or population that exceeds the ROI's historical annual change

- Adversely affect social services or social conditions, including property values, school enrollment, county or municipal expenditures, or crime rates
- Disproportionately impact minority populations or low-income populations.

Infrastructure Evaluation Criteria

Effects on infrastructure are evaluated based on their potential for disruption or improvement of existing levels of service and additional needs for energy and water consumption, sanitary sewer and wastewater systems, and transportation patterns and circulation. Impacts might arise from physical changes to circulation, construction activities, introduction of construction-related traffic on local roads or changes in daily or peak-hour traffic volumes, and energy needs created by either direct or indirect workforce and population changes related to installation activities. An effect might be considered adverse if a proposed action exceeded capacity of a utility. A proposed action could have a significant effect with respect to infrastructure if the following were to occur:

- Exceeded capacity of a utility
- A long-term interruption of the utility
- A violation of a permit condition
- A violation of an approved plan for that utility.

Hazardous Materials and Wastes Evaluation Criteria

A proposed action could have a significant effect with respect to hazardous materials and wastes if the following were to occur:

- Noncompliance with applicable Federal and state regulations as a result of the proposed action
- Disturbance or creation of contaminated sites resulting in adverse effects on human health or the environment
- Established management policies, procedures, and handling capacities could not accommodate the proposed activities, impacting fuel management.

Safety Evaluation Criteria

Any increase in safety risks would be considered an adverse effect on safety. A proposed action could have a significant effect with respect to health and safety if the following were to occur:

- Substantially increase risks associated with the safety of construction personnel, contractors, or the local community
- Substantially hinder the ability to respond to an emergency
- Introduce a new health or safety risk for which the installation is not prepared or does not have adequate management and response plans in place.

4.2 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, Grand Forks AFB would not implement the projects proposed in the installation's community of plans, which would result in the continuation of existing conditions as described in **Section 3**. No direct changes in environmental effects would be expected on the noise environment, land use, air quality, geological resources, water resources, biological resources, cultural resources, socioeconomics and environmental justice, infrastructure, hazardous materials and wastes, or safety. It is anticipated that future development would occur under the No Action Alternative, but those development projects would be analyzed through the preparation of project-specific NEPA documentation, as appropriate.

4.3 Environmental Consequences of the Proposed Action by Resource Area

4.3.1 Noise

Construction Noise. Implementation of the proposed projects would be expected to result in short-term, minor, adverse effects on the noise environment from equipment that would be used during demolition, construction, or infrastructure upgrade activities. The projects identified in **Tables 2-1, 2-2, and 2-3** would be implemented at different times and different locations over the next 5 years. It is possible that several projects would occur simultaneously but would not be expected to result in adverse effects beyond those described in **Sections 4.4.1, 4.4.2, and 4.4.3**.

Projects under the Proposed Action would require grading, paving, demolition, and building construction. All of the projects under the Proposed Action would occur on Grand Forks AFB; some of the projects would be adjacent to military housing.

Under the Proposed Action, the majority of projects are proposed in the south-central region of the installation, which consists of industrial and administrative facilities. Some of the projects are proposed in the northern and western region of the installation, which consists of airfield operations and training facilities. Populations several hundred feet from the construction site could experience noise levels in the 70 dBA range. Workforce populations adjacent to the project site could experience noise levels in the mid-80 dBA range. Examples of expected construction noise are as follows:

- Personnel living on the southeastern side of the installation, approximately 700 feet away from Building 314 and 242 would experience noise levels of approximately 72 dBA during the construction of an access road and expanded parking (Projects I1). These residents would also be approximately 2,000 feet from the site of the project Construct Security Forces Center (Project C1) and would experience noise levels of approximately 61 dBA during construction activities.
- Personnel working in Building 652 during renovation and repair (Project I2) would experience intermittent noise levels of up to 92 dBA. These personnel would be exposed to work noise from small electrical tools (e.g., drills, saws, grinders) intermittently during the repair and renovation of the building.
- Personnel working in the Wing HQ, Building 307, approximately 100 feet away from the Communication Squadron building and the proposed Security Forces Center Building, would experience intermittent work noise levels of up to 92 dBA (Projects C1, I15, and I16).

Individual equipment used for demolition and construction activities would be expected to result in noise levels comparable to those shown in **Table 4-1**. Noise from demolition and construction activities varies depending on the type of equipment being used, the area that the action would occur in, and the distance from the noise source. To predict how these activities would impact adjacent populations, noise from the probable equipment was estimated. For example, as shown in **Table 4-1**, demolition usually involves several pieces of equipment (e.g., bulldozers and loaders) that can be used simultaneously. Under the Proposed Action, the cumulative noise from the demolition equipment, during the busiest day, was estimated to determine the total impact of noise from demolition activities at a given distance. Examples of expected cumulative demolition and construction noise during daytime hours at specified distances are shown in **Table 4-1**.

Table 4-1. Estimated Noise Levels Resulting from Demolition and Construction Activities

Type of Activity	dBA at 50 feet	dBA at 300 feet	dBA at 500 feet	dBA at 1,000 feet	dBA at 3,000 feet
Demolition and Construction	94	78	74	68	58

Given the extent of the projects associated with the Proposed Action and the proximity to residents on the installation, short-term, minor, adverse effects from construction noise would be expected. However, noise generation would last only for the duration of construction activities and could be minimized through measures such as the restriction of construction activity to normal working hours (i.e., between 7:00 a.m. and 5:00 p.m.) and the use of equipment exhaust mufflers. It is not anticipated that the short-term increase in ambient noise levels from the Proposed Action would cause significant adverse effects on the surrounding populations.

Operational Impacts. It is not anticipated that vehicle traffic or aircraft operations would increase under the Proposed Action. The operations associated with the projects Construct Consolidated Security Forces and Construct BCE Pavements and Maintenance Facility/Snow Barn (Projects C1 and C2) would not be expected to contribute significantly to the ambient noise environment. Noise levels would be affected by use of the project Construct Indoor Small Arms Range (Project C3) on personnel within the building; however, hearing protection would likely be worn, which would provide protection against effects from high levels of short-term noise. No long-term effects on the ambient noise environment would be anticipated as a result of the Proposed Action.

4.3.2 Land Use

No significant adverse effects on land use would be expected under the Proposed Action. The Proposed Action would occur entirely on Grand Forks AFB property and the proposed projects listed in **Tables 2-1**, **2-2**, and **2-3** would be sited in a manner compatible with Grand Forks AFB's land uses. The proposed projects would comply with existing land use plans and policies as identified in the *General Plan: Grand Forks Air Force Base, ND* (USAF 2006). Therefore, the proposed projects would result in no effects or negligible, adverse effects on land use. Cantonment area projects would introduce new land uses (projects include Youth Center [Project C4] and Construct Dog Park [Project C5]) or the expansion or improvement of existing uses (Construct Multi-Use Trail along Eielson Street [Project C6], Repair CS Admin Parking Lot and Energy Conservation: Repair HVAC-GSHP-CS [Projects I5 and I6], and Construct Base Engineer Admin/Shops/Contracting – Phases I and 2 and Central Deployment Center [Projects C11 and C12]) that would further the cantonment area function supporting Grand Forks AFB and its missions. The new land uses within the cantonment area would be compatible with the existing

land use designation such as Community, Housing, and Administration. Construction of these projects might result in minor adverse effects related to noise issues, but these effects would be temporary.

4.3.3 Air Quality

The Proposed Action would generate both temporary and long-term air pollutant emissions. The construction, demolition, and infrastructure projects associated with the Proposed Action would generate air pollutant emissions as a result of grading, filling, compacting, trenching, demolition, and construction operations, but these emissions would be temporary and would not be expected to generate any offsite effects. The Proposed Action would not result in a net increase in personnel or commuter vehicles. Therefore, the Proposed Action's emissions from existing personnel and commuter vehicles would not result in an adverse impact on regional air quality.

Construction operations would result in short-term emissions of criteria pollutants as combustion products from construction equipment, and evaporative emissions from architectural coatings and asphalt paving operations. Emissions of all criteria pollutants would result from construction and demolition activities including combustion of fuels from on-road haul trucks transporting materials and construction commuter emissions.

Construction, demolition, and infrastructure projects would generate particulate matter emissions as fugitive dust from ground-disturbing activities and concrete cutting. Fugitive dust emissions would be greatest during initial site-preparation activities and would vary from day to day depending on the construction phase, level of activity, and prevailing weather conditions. The quantity of uncontrolled fugitive dust emissions from a construction site is proportional to the area of land being worked and the level of construction activity. Appropriate fugitive dust-control measures would be employed during construction and demolition activities to suppress emissions.

Operational emissions associated with the Proposed Action would not be expected to result in adverse effects on air quality. Day-to-day operations associated with the Proposed Action would generate emissions of criteria pollutants as combustion products from the burning of natural gas by boilers used to provide comfort heating and the combustion of fuel oil by emergency generators to produce electrical power, but these emissions would typically be offset by the removal of older and more emissive equipment. In addition, local and regional pollutant effects resulting from direct and indirect emissions from stationary emissions sources under the Proposed Action would result in no new impacts on air quality as the same quantities of hazardous emitting chemicals used under the existing procedures would be the same for new facilities and procedures. All relocation and obtaining of new stationary sources would be coordinated with the NDDH and would comply with all Title V permit operating conditions. Any other project for the future out-years that would involve new or additional emissions would be addressed through Federal and state permitting program requirements under New Source Review regulations (40 CFR Parts 51 and 52).

The Energy Information Administration estimates that in 2005, gross CO₂ emissions in North Dakota were 53.6 million metric tons (DOE/EIA 2005). Approximately 4,359 metric tons of CO₂ were estimated to be emitted by the Proposed Action, which is less than 0.007 percent of the North Dakota statewide CO₂ emissions. Therefore, the Proposed Action would have a negligible contribution towards the North Dakota statewide GHG inventory. CO₂ emission estimates are included in **Appendix C**.

Since Grand Forks AFB is classified as an attainment area for all criteria pollutants, General Conformity Rule requirements are not applicable. The Proposed Action would generate emissions well below *de minimis* levels. In addition, the Proposed Action would generate emissions well below 10 percent of the emissions inventories for North Dakota AQCR 172 and the emissions would be short-term.

Therefore, the construction, demolition, and infrastructure activities associated with the Proposed Action would not have significant effects on air quality at Grand Forks AFB or on regional or local air quality. **Appendix C** includes the air emissions estimation spreadsheets and methodology.

Air Quality. Short-term, minor, adverse impacts would be expected from demolition and construction emissions and land disturbance. The Proposed Action would result in minor impacts on regional air quality during demolition and construction activities, primarily from site-disturbing activities, operation of construction equipment, evaporative emissions from architectural coatings, and concrete and asphalt paving operations. Appropriate fugitive dust-control measures would be employed during construction activities to suppress emissions. All emissions associated with construction operations would be temporary in nature. Although the proposed projects would span a 5-year period, all proposed projects were analyzed as if they would occur in 1 year. It is not expected that emissions from demolition and construction of the projects associated with the Proposed Action would contribute to or affect local or regional attainment status with the NAAQS. Emissions from the Proposed Action are summarized in **Table 4-2**. Emissions estimation spreadsheets and a summary of the methodology used are included in **Appendix C**.

Table 4-2. Estimated Air Emissions Resulting from All Proposed Action Projects

Activity	NO _x tpy	VOC tpy	CO tpy	SO ₂ tpy	PM ₁₀ tpy	PM _{2.5} tpy	CO ₂ tpy
Construction Combustion	32.424	3.392	13.741	1.773	2.183	2.118	3,753,647
Construction Fugitive Dust	--	--	--	--	174.019	14.365	--
Haul Truck On-Road	1.484	1.073	4.362	0.117	1.765	0.459	375.785
Construction Commuter	0.110	0.110	0.992	0.001	0.010	0.007	131.482
Total Proposed Action Emissions	34.019	4.575	19.094	1.892	177.978	16.949	4,260.914
Percent of AQCR 172 Inventory	0.020	0.011	0.006	0.001	0.050	0.027	0.007*

Note: * Percent of State of North Dakota CO₂ emissions.

Since Grand Forks AFB is classified as an attainment area for all criteria pollutants, General Conformity Rule requirements are not applicable. The Proposed Action would generate emissions well below *de minimis* levels. In addition, the Proposed Action would generate emissions well below 10 percent of the emissions inventories for North Dakota AQCR 172 and the emissions would be short-term. Therefore, the construction, demolition, and infrastructure activities associated with the Proposed Action would not have significant effects on air quality at Grand Forks AFB or on regional or local air quality.

4.3.4 Geological Resources

No significant effects on geology or soils would be expected from implementing the Proposed Action.

Topography. Long-term, negligible to minor, direct, adverse effects would be expected on the natural topography as a result of demolition, site preparation (i.e., grading, excavating, and recontouring), and construction under the Proposed Action.

Geology. Long-term, negligible effects on geological resources would be expected to result from demolition, site preparation (i.e., grading, excavating, and recontouring), and construction under the Proposed Action. Grading, excavation, and recontouring activities would be expected to be minimal.

Soils. Long-term, minor, adverse effects on geology and soils would be expected from implementation of the Proposed Action. The primary effects would be soil compaction, disturbance, and erosion. Site-specific soil surveys should be conducted prior to implementing projects to determine if engineering limitations exist and to determine appropriate design considerations or best management practices (BMPs) to offset potential adverse effects. Erosion and sedimentation control plans would be developed and implemented both during and following site development to contain soil and runoff onsite, and would reduce potential for adverse effects associated with erosion and sedimentation and transport of sediments in runoff.

Several projects would be anticipated to result in beneficial effects on soils due to reduced impervious surfaces. These include Demolish Family Housing PH6 (Project D4), Demolish DRMO Facilities (Project D5), Demolish Bunch and Gray Hall Dormitories (Project D6), and Demolish Freedom Hall Dormitory (Project D8).

4.3.5 Water Resources

No significant effects on water resources would be expected from implementing the project associated with the Proposed Action. The Proposed Action would result in short- and long-term, minor impacts on water resources as impervious surfaces increase, soil becomes compacted and alters natural drainage flow, soil erosion and sedimentation occurs, and vegetation is removed. However, adverse effects would be minimized by implementing BMPs and following an approved erosion-and-sediment-control plan (ESCP). Under the CWA Final Rule described in **Section 3.5.1**, projects that would disturb more than 1 acre of land would be required to use BMPs to ensure that soil disturbed during construction activities does not pollute nearby water bodies. The following projects associated with the Proposed Action meet this criteria: Demolish MSA Revised Plan (Project D1); Demolish Hangars 520, 521, 522, and 523 (Project D3); Construct Consolidated Security Forces (Project C1); Construct BCE Pavements and Maintenance Facility/Snow Barn (Project C2); Construct Indoor Small Arms Range (C3); Construct Dog Park MFH (Project C5); Construct Multi-Use Trail Along Eielson Street (Project C6); Construct Base Engineer Admin/Shops/Contracting – Phases 1 and 2 (Project C11); Construct Central Deployment Center (Project C12); and Construct Access Road/Parking at Buildings 314 and 242 (Project I1). No projects proposed for implementation in 2014 would exceed a project footprint of 20 acres, so no monitoring would be required under the Final Rule.

Wetland hydrology could be directly altered by implementing two proposed projects: Construct BCE Pavements and Maintenance Facility/Snow Barn (Project C2) and Construct Indoor Small Arms Range (Project C3). Effects would not be significant based on proper implementation of environmental protection measures and construction BMPs and techniques outlined in **Appendix G**. Four projects under the Proposed Action are adjacent to wetland and water resource areas. These projects include Construct Multi-Use Trail Along Eielson Street (Project C6), Demolish MSA Revised Plan (Project D1) Construct Access Road/Parking at Buildings 314 and 242 (Project I1), and Repair HVAC-GSHP-CATM (Project I2). Impacts on adjacent wetlands and other water resources would be avoided through design, siting, and proper implementation of appropriate environmental protection measures and BMPs as presented in **Appendix G**. Proper implementation of appropriate environmental protection measures and BMPs identified in **Appendix G** would ensure that no effects on surrounding wetlands or other waters of the United States would occur. Correspondence with regulatory and resource agencies prior to commencing any ground-breaking construction activities and permitting would be obtained, as necessary.

In addition, several of the projects associated with the Proposed Action would decrease impervious surfaces and storm flow once fully implemented, which would be beneficial to water resources if vegetation is reestablished. These projects could include all of the demolition projects.

Implementation of some of the construction projects would require an NDPDES construction permit for storm water discharges. An NDPDES construction permit would be required for small construction projects that disturb at least 1 acre of land, or if disturbance is less than 1 acre but is part of a larger common plan of development disturbing greater than or equal to 1 but less than 5 acres (NDDH 2009b). Projects requiring an NDPDES permit could include the representative construction projects (discussed in detail in **Section 4.4.2**) Construct Base Engineer Admin/Shops/Contracting – Phases 1 and 2 (Project C11) and Construct Central Deployment Center (Project C12).

4.3.6 Biological Resources

Vegetation. The Proposed Action would be expected to result in direct, short-term and long-term, negligible, adverse effects on vegetation on Grand Forks AFB. The majority of vegetation near the proposed projects is modified, landscaped, and mowed regularly. Short-term, negligible, adverse effects on vegetation would be expected from temporary disturbances during construction and demolition activities (e.g., trampling and removal). This vegetation would be expected to regenerate once demolition activities have ceased if no new development would be constructed at the demolition site.

Long-term, negligible, adverse effects on vegetation would be expected from the permanent removal of vegetation from construction of new buildings and infrastructure. As there have been no observations made of any unique native vegetative species occurring within the proposed project areas, all impacts on vegetation are expected to be negligible.

Long-term, negligible, beneficial effects on vegetation would also be expected from the Proposed Action. If the project areas would be revegetated with native vegetation after the proposed demolition projects have been completed, long-term, beneficial effects could occur. Removal of large mature trees would result in long-term, adverse effects. Replanting of native trees to replace removed trees would be expected to offset adverse effects of tree removal over time. Long-term, beneficial effects on vegetation would be expected as a result of planting native trees near the MFH area.

During and immediately following construction and demolition activities that result in ground disturbances, soils would be exposed and vegetation would be sparse in some areas, thus allowing opportunities for noxious weeds to become established in those areas. However, once demolition and construction activities have ceased, the disturbed areas would be replanted with sod. Therefore, noxious weeds would not be expected to become permanently established in disturbed areas and no long-term, adverse impacts from noxious weeds would be expected. Long-term, negligible to minor, beneficial impacts on noxious weed management would be expected if the Proposed Action resulted in removal of noxious weeds as a result of demolition and construction activities and replacement of these plants with noninvasive grass species.

Wildlife. The Proposed Action would have direct, short-term, negligible to minor, adverse effects on wildlife due to disturbances from noise, demolition and construction activities, and heavy equipment use. High noise events could cause wildlife to engage in escape or avoidance behaviors, resulting in short-term, negligible, adverse effects. The areas of disturbance would be relatively small in size and generally within developed areas where disturbances are common (e.g., mowing and landscaping, traffic, aircraft). Most wildlife species in the proposed project vicinities would be expected to quickly recover once the construction or demolition noise and disturbances have ceased for the day or project period; therefore, no

long-term, adverse effects on wildlife would be expected as a result of temporary construction and demolition disturbances.

The most valuable wildlife habitat, particularly for bird species, occurring on the main installation are the shallow marshes (prairie potholes and drainage ditches) and the open grassland. The majority of these habitat types occur in the northern, western, and southeastern portions of the installation, which do not include any of the proposed projects. The closest proposed project to these habitats is the repair of the runway (see **Section 4.4.3.3**). However, even though the grasslands north and west of the runway might provide higher quality habitat to many species, wildlife species utilizing this area are anticipated to be habituated to high noise events due to the proximity of the site to the runway; therefore, adverse effects would still likely be negligible.

Long-term, negligible to minor, adverse effects on wildlife would be expected from the permanent loss of wildlife habitat from proposed construction projects. The anticipated footprint of lost habitat from proposed construction projects and four infrastructure projects involving construction of new roads and parking lots is approximately 44 acres; however, the vast majority of this habitat is either landscaped or in mixed grasses that are mowed regularly to maintain a height of 7 to 14 inches. In addition, most of these construction and infrastructure projects are within the cantonment area or within close proximity to the runway and as such would not be expected to be high-value habitat; therefore, the loss of habitat from the Proposed Action would be expected to be minor.

Long-term, negligible to minor, beneficial effects on wildlife would be expected from the revegetation of some of the proposed demolition sites, particularly if they are revegetated with native plant species. Additionally, long-term, negligible to minor, beneficial effects on wildlife would be expected from the provision of new habitat for several species through replacement of dead trees and shrubs in the shelterbelts and planting of new trees near the military family housing area. However, some dead trees provide habitat for cavity nesters, which would be lost through the removal of these trees. Most cavity nesters or other birds utilizing these trees as nesting substrate are anticipated to be migratory birds as listed in 50 CFR 10.13 and would be protected under the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. 703–712) as amended, and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*. The MBTA and EO 13186 require Federal agencies to minimize or avoid impacts on migratory birds listed in 50 CFR 10.13. BMPs, which are discussed below for migratory birds, are recommended for reduction or avoidance of impacts on potential cavity nesters or other nesting species within the shelterbelts if these trees are removed under the Proposed Action.

Protected and Sensitive Species. No federally listed threatened or endangered species are known to occur on Grand Forks AFB; therefore, no impacts on federally listed threatened or endangered species would be expected from the Proposed Action. Habitats on the installation do support use by state-listed threatened species (as defined by the North Dakota Natural Heritage Program) and species of conservation priority. Most of these are migratory bird species that use a variety of habitats on Grand Forks AFB, such as grasslands and wetland areas. There is no critical or significant habitat present on Grand Forks AFB. Breeding birds that are species of conservation concern or state-listed species have been documented at the installation (see listing in **Appendix E**). Short-term and long-term, negligible to minor, adverse effects on state-protected and state-sensitive species would be expected from the Proposed Action as a result of noise from construction and demolition activities, and permanent loss or degradation of habitat.

The MBTA and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, require Federal agencies to minimize or avoid impacts on migratory birds listed in 50 CFR 10.13. If design and implementation of a Federal action cannot avoid measurable negative impacts on migratory birds, EO 13186 requires the responsible agency to consult with the USFWS and obtain a Migratory Bird Depredation Permit. Grand Forks AFB currently maintains a Migratory Bird Depredation Permit from

the USFWS for airfield grounds, issued for the following species: cliff swallow, barn swallow (*Hirundo rustica*), mallard (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), redhead, ruddy duck (*Oxyura jamaicensis*), northern shoveler (*Anas clypeata*), Canada goose (*Branta canadensis*), Swainson's hawk, red-tailed hawk (*Buteo jamaicensis*), ring-billed gull (*Larus delawarensis*), horned lark (*Eremophila alpestris*), mourning dove, cliff swallow nests, and barn swallow nests (GFAFB 2005). Construction and demolition associated with the proposed action would be conducted in a manner to avoid adverse impacts on migratory birds to the extent practicable.

The following BMPs are recommended for reduction or avoidance of impacts on migratory birds that could occur within the project areas:

- Any groundbreaking construction activities should be performed before migratory birds return to Grand Forks AFB or after all young have fledged to avoid incidental take.
- If construction or demolition is scheduled to start during the period in which migratory bird species are present, steps should be taken to prevent migratory birds from establishing nests in the potential impact area. These steps could include covering equipment and structures and use of various excluders (e.g., noise). Birds can be harassed to *prevent* them from nesting within the project area. Once a nest is established, they should not be harassed until all young have fledged and are capable of leaving the nest site.
- If construction is scheduled to start during the period when migratory birds are present, a site-specific survey for nesting migratory birds should be performed starting at least 2 weeks prior to site clearing.
- If nesting birds are found during the survey, buffer areas should be established around nests. Construction should be deferred in buffer areas until birds have left the nest. Confirmation that all young have fledged should be made by a qualified biologist.

The *Bald and Golden Eagle Protection Act* could apply to the implementation of the Proposed Action if it is determined that a bald eagle nest could be affected. The bald eagle has been witnessed hunting in the sewage lagoons of Grand Forks AFB east of the main installation (GFAFB 2008a); however, no eagle nests have been observed on or near Grand Forks AFB and no critical habitat for this species has been designated in Grand Forks County. If a bald eagle nest is discovered near the project areas, the USFWS and North Dakota Game and Fish Department would be consulted to ensure compliance with the *Bald and Golden Eagle Protection Act* and state regulations; therefore, the implementation of the Proposed Action is not expected to have adverse effects on bald eagles.

Wetland Habitat. It is USAF policy to avoid constructing new facilities within areas containing wetlands, where practicable. If a construction project does occur within a wetland, direct, adverse effects would be expected. In accordance with EO 11990, *Protection of Wetlands*, a FONPA would need to be prepared and approved by HQ AMC for all projects occurring within wetland areas. In addition, for those actions determined to adversely impact jurisdictional wetlands on the installation through dredging or placement of fill within wetlands, Grand Forks AFB would be required to obtain a permit under Section 404 of the CWA and would likely be required to mitigate or compensate for the impacts made on these wetlands in order to comply with the "No Net Loss" national policy.

Two projects from the proposed projects at Grand Forks AFB have potential to have minor, direct, adverse impacts on wetlands or other jurisdictional waters of the United States (e.g., dredging or placement of fill). These projects include Construct Base Civil Engineering Pavements and Maintenance Facility/Snow Barn (Project C2) and Construct Indoor Small Arms Range (Project C3) (see **Figure 2-1**). Because these projects would directly impact wetlands or other jurisdictional waters of the United States, a FONPA has been prepared and would be approved by HQ AMC. In addition, Grand Forks AFB would

be required to obtain a permit under Sections 401 and 404 of the CWA prior to commencing any construction activities. Impacts on adjacent wetlands and other water resources would be avoided through design, siting, and proper implementation of appropriate environmental protection measures and BMPs as presented in **Appendix G** that ensure no effects on surrounding wetlands or other waters of the United States would occur. These environmental protection measures and BMPs include flagging the wetland boundary; installing silt fencing; establishing a wetland buffer; and following policies and procedures as detailed in ESCPs, SWPPPs, and SPCCs. Any necessary agency coordination and required permits would be obtained prior to commencing any ground-breaking construction activities. Therefore, effects on wetlands and other waters of the United States would not be significant based on proper implementation of environmental protection measures and construction as outlined in **Appendix G**.

Four other projects are adjacent or close to wetlands and other jurisdictional waters of the United States. These include Demolish MSA Revised Plan (Project D1), Construct Multi-Use Trail Along Eielson Street (Project C6), Construct Access Road/Parking at Buildings 314 and 242 (Project I1), and Repair HVAC-GSHP at Building 652 (Project I2) (see **Figures 2-1** and **2-2**). However, these projects would not have any direct impacts on wetlands or waters of the United States and all potential indirect adverse impacts on wetlands and other waters of the United States would be avoided through design and implementation of environmental protection measures and BMPs as outlined in **Appendix G**. In addition, all project designs would be coordinated with 319 CES/CEA.

Adherence to an ESCP and SWPPP should prevent surface water degradation of wetlands within close proximity of project sites associated with the Proposed Action. Assuming appropriate environmental protection measures and BMPs are implemented during construction and demolition activities, no adverse effects on receiving wetlands would be expected. In the event of a spill or leak of fuel or other construction-related products, there could be adverse effects on wetland surface water quality. All fuels and other potentially hazardous materials would be contained and stored appropriately. In the event of a spill, procedures outlined in Grand Forks AFB's SPCC Plan would be followed to quickly contain and clean up a spill (see **Sections 3.10** and **4.3.10** for a discussion on hazardous materials and wastes). If it is determined that discharge into navigable waters from facility construction or operations would occur, Grand Forks AFB would also be required to undergo Section 401 water quality certification by the North Dakota Department of Health & Environmental Division of Water Quality (DHEWQ).

4.3.7 Cultural Resources

Archaeological Resources. No effects on known archaeological resources would be expected under the Proposed Action from the projects listed in **Tables 2-1**, **2-2**, and **2-3**. Six archaeological sites and six isolated finds have been identified at Grand Forks AFB through previous archaeological surveys and all were determined ineligible for NRHP listing. Due to indicators of high probability for archaeological deposits, activities involving significant ground disturbance in the northeastern corner of the installation would require review by the cultural resources manager and SHPO consultation (USAF 2008b). However, no projects are planned in this area. The Proposed Action would occur either in areas that have been previously surveyed or areas with low probabilities for archaeological resources.

In the event of an inadvertent discovery on Grand Forks AFB, all work in the immediate vicinity of the discovery would be halted until the materials are identified and documented and an appropriate mitigation strategy is developed in consultation with the SHPO and other consulting parties. In compliance with NAGPRA, tribal representatives would be notified and consulted about the proposed treatment of human remains and funerary and sacred objects should these be discovered during implementation of the Proposed Action. Accordingly, the Proposed Action would have no effect on known archaeological resources.

Architectural Resources. The Proposed Action would not be expected to result in adverse impacts on NRHP-eligible or potentially eligible architectural resources. Eight architectural resources (Buildings 313, 714, 606, and 703 through 707) have been determined eligible or considered potentially eligible for NRHP listing. The Proposed Action consists of new construction, demolition, and infrastructure projects located in the general vicinity of these resources. None of the projects would directly impact any of these properties. These projects could have short-term, negligible to minor impacts during the period of construction and long-term, negligible visual effects on the NRHP-eligible or potentially eligible resources.

Five buildings (i.e., Buildings 515, 520, 521, 522, and 523) listed under the Proposed Action for demolition have been previously evaluated for Cold War significance under Criterion Consideration G and were determined not eligible for NRHP listing. The buildings would need to be reevaluated for NRHP eligibility under evaluation Criteria A–D as part of Grand Forks AFB’s compliance with Section 106 for these actions. Ongoing consultation with the North Dakota SHPO would be completed prior to finalizing this IDEA.

Several buildings to be demolished under the Proposed Action are covered under two PCs issued by ACHP in 2006. This includes 7 buildings in the MSA (Buildings 712, 717, 719, 723, 724, and 727) that would be demolished under the 2006 ACHP PC regarding ammunition storage facilities (ACHP 2006a), and 3 buildings (Buildings 221, 222, and 219) that would be demolished under the 2006 ACHP *Program Comment for Cold War Era (1946-1974) Unaccompanied Personnel Housing* (ACHP 2006b).

Table 4-3 lists the status of NRHP eligibility and SHPO consultation for all buildings proposed to be demolished under the Proposed Action. Consultation with the North Dakota SHPO is in progress and would be completed prior to the finalization of the EA, in accordance with AFI 32-7065, *Cultural Resource Management Program*. **Appendix F** contains documentation on NRHP Eligibility Evaluations, SHPO Concurrence, and ACHP Program Comments. **Appendix F** documents related to the Proposed Action will be expanded throughout the EIAP process.

Resources of Traditional, Religious, or Cultural Significance to Native American Tribes. Because the projects associated with the Proposed Action would involve ground-disturbing activities during demolition and construction, they have the potential to impact resources of traditional, religious, or cultural significance to Native American tribes, if present. However, there are currently no known resources of significance to Native American tribes at Grand Forks AFB (USAF 2008b). Grand Forks AFB would continue consultation efforts with Tribes in conjunction with the planning for specific projects outlined in the Proposed Action. If resources of traditional, religious, or cultural significance to Native American tribes are identified within a project APE, Grand Forks AFB would avoid, minimize, or mitigate any impacts from the Proposed Action on those resources.

4.3.8 Socioeconomics and Environmental Justice

Socioeconomics. No significant effects on socioeconomics would be expected from implementation of the Proposed Action. Impacts on the local economy would be short-term, direct and indirect, and minor, and beneficial as a result of construction expenditures. The GFMSA contains approximately 5,000 construction workers which collectively should be able to meet the demand of the Proposed Action. However, some of the construction and demolition might be completed by soldiers at Grand Forks AFB. The use of local construction workers would produce increases in local sales volumes, payroll taxes, and the purchases of goods and services resulting in short-term, indirect, minor, and beneficial increases in the local economy. The Proposed Action would not lead to either increases or decreases in the number of persons employed or stationed at Grand Forks AFB; therefore, no significant effects on demographics would be expected.

Environmental Justice. Activities associated with the Proposed Action would occur on Grand Forks AFB. Therefore, disproportionate impacts on minority or low-income populations would not be expected.

Table 4-3. Status of NRHP Evaluation and SHPO Consultation for Buildings to be Demolished Under the Proposed Action.

Project Name	Building	Date Constructed	SHPO Concurrence Status
D1. Demolish MSA Revised Plan	712	1965	Covered under 2006 ACHP Ammunition Storage PC
D1. Demolish MSA Revised Plan	717	1960	Covered under 2006 ACHP Ammunition Storage PC.
D1. Demolish MSA Revised Plan	719	1965	Covered under 2006 ACHP Ammunition Storage PC.
D1. Demolish MSA Revised Plan	723	1971	Covered under 2006 ACHP Ammunition Storage PC.
D1. Demolish MSA Revised Plan	724	1971	Covered under 2006 ACHP Ammunition Storage PC.
D1. Demolish MSA Revised Plan	725	1972	Covered under 2006 ACHP Ammunition Storage PC.
D1. Demolish MSA Revised Plan	727	1972	Covered under 2006 ACHP Ammunition Storage PC.
D1. Demolish MSA Revised Plan	729	1980	Less than 50 years old; not exceptionally significant under Criterion Consideration G.
D1. Demolish MSA Revised Plan	737	1982	Consultation with the North Dakota SHPO is ongoing.
D1. Demolish MSA Revised Plan	738	1982	Less than 50 years old; not exceptionally significant under Criterion Consideration G.
D2. Consolidated Security Forces Project	304	1969	Less than 50 years old; not exceptionally significant under Criterion Consideration G.
D2. Consolidated Security Forces Project	515	1957	Not eligible under Criteria Consideration G; re-evaluation needed due to age. Consultation in progress.
D3. Demolish Hangars	520	1958	Not eligible under Criterion Consideration G; re-evaluation needed due to age. Consultation in progress.
D3. Demolish Hangars	521	1958	Not eligible under Criterion Consideration G; re-evaluation needed due to age. Consultation in progress.
D3. Demolish Hangars	522	1957	Not eligible under Criterion Consideration G; re-evaluation needed due to age. Consultation in progress.

Project Name	Building	Date Constructed	SHPO Concurrence Status
D3. Demolish Hangars	523	1957	Not eligible under Criterion Consideration G, re-evaluation needed due to age. Consultation in progress.
D4. Demolish Family Housing Phase 6	1715	1964	SHPO concurred; no historic properties affected.
D4. Demolish Family Housing Phase 6	1719	1964	SHPO concurred; no historic properties affected.
D4. Demolish Family Housing Phase 6	1725	1964	SHPO concurred; no historic properties affected.
D4. Demolish Family Housing Phase 6	1729	1964	SHPO concurred; no historic properties affected.
D4. Demolish Family Housing Phase 6	1731	1964	SHPO concurred; no historic properties affected.
D4. Demolish Family Housing Phase 6	1739	1964	SHPO concurred; no historic properties affected.
D4. Demolish Family Housing Phase 6	1741	1964	SHPO concurred; no historic properties affected.
D4. Demolish Family Housing Phase 6	1743	1964	SHPO concurred; no historic properties affected.
D4. Demolish Family Housing Phase 6	1745	1964	SHPO concurred; no historic properties affected.
D4. Demolish Family Housing Phase 6	1747	1964	SHPO concurred; no historic properties affected.
D5. Demolish DRMO Facilities	430	1980	Less than 50 years old; not exceptionally significant under Criterion Consideration G.
D5. Demolish DRMO Facilities	432	1969	SHPO concurred; no historic properties affected.
D5. Demolish DRMO Facilities	437	1971	SHPO concurred; no historic properties affected.
D5. Demolish DRMO Facilities	442	1982	Less than 50 years old; not exceptionally significant under Criterion Consideration G.
D6. Demolish Gray and Bunch Hall Dorms	221	1958	Covered under 2006 ACHP Unaccompanied Personnel Housing PC.
D6. Demolish Gray and Bunch Hall Dorms	222	1958	Covered under 2006 ACHP Unaccompanied Personnel Housing PC.
D8. Demolish Freedom Dorm	219	1958	Covered under 2006 ACHP Unaccompanied Personnel Housing PC.

Sources: ACHP 2006a, ACHP 2006b, NDSHS 2006, NDSHS 2009, Weitze 1996

Note: All documentation regarding SHPO concurrence and PCs by ACHP are located in **Appendix F**.

4.3.9 Infrastructure

The Proposed Action would not result in long-term, adverse effects on the installation's infrastructure. However, long-term, beneficial effects would also be realized from implementing improved infrastructure projects.

Airfield. Short-term, minor, direct, adverse effects on the airfield would be expected from the Proposed Action. Grand Forks AFB proposes to upgrade the airfield by repairing the runway (Project I3).

Long-term, minor, direct, beneficial effects on the airfield would be expected from the Proposed Action. Planned airfield pavement repairs and construction would improve the condition of the Grand Forks AFB airfield and aircraft operations at the installation. The long-term, beneficial effects associated with the Proposed Action would outweigh the short-term, adverse effects.

Transportation. Short-term, negligible to minor, direct, adverse effects on the transportation network would be expected from implementing the Proposed Action. Increased traffic associated with demolition and construction vehicles would be expected to have a short-term, minor, adverse effect on the transportation network at Grand Forks AFB. The construction and demolition phases of the Proposed Action would require delivery of materials to and removal of debris from demolition and construction sites. Construction traffic would compose a small percentage of the total existing traffic on the installation. Many of the heavy construction vehicles would be driven to the site and kept on site for the duration of construction and demolition activities, resulting in relatively few additional trips. The proposed installation development activities would occur at different times and locations on Grand Forks AFB, which would further reduce construction traffic. Any potential increases in traffic volume associated with proposed demolition and construction activities would be temporary.

Long-term, beneficial effects on the transportation network would be expected from the Proposed Action. Grand Forks AFB proposes several transportation upgrades, including the following projects: Construct Access Road/Parking at Buildings 314 and 242 (Project I1), Repair CS Admin Parking Lot (Project I5), and Construct Multi-Use Trail Along Eielson Street (Project C6). The Proposed Action would improve the condition of the transportation network and provide additional parking at Grand Forks AFB.

Electrical. Short-term, negligible, direct, adverse effects on the electrical system would be expected during demolition and construction activities associated with the Proposed Action. Short-term electrical interruptions could be experienced when buildings are disconnected from or connected to the Grand Forks AFB electrical distribution system. However, the discontinuation of electrical services would be temporary and coordinated with area users prior to disconnection.

Long-term, negligible, indirect, beneficial effects on electrical systems would be expected from the Proposed Action by demolishing old buildings with outdated electrical systems and constructing new buildings with updated electrical systems. In addition, proposed HVAC system upgrades would provide long-term, beneficial effects on the electrical system by reducing demand. Due to the growth of the installation and technological advancements employed by Grand Forks AFB, the electrical system is continually improved to meet the growing mission at Grand Forks AFB. The Proposed Action would result in a negligible change in electrical demands on the installation.

Central Heating and Cooling. Short-term, negligible, adverse effects on the central heating system at Grand Forks AFB would be expected as a result of the Proposed Action. Short-term interruptions in heating and cooling services could be experienced when buildings are disconnected from or reconnected to the central heating system. Long-term, negligible to minor, beneficial effects would be realized from the removal of outdated HVAC systems and replacement with the more energy-efficient GSHPs. The Proposed Action would result in a minor change in demand on the central heating and cooling system.

However, the discontinuation of central heating and cooling services would be temporary and coordinated with area users prior to disconnection.

Natural Gas. Short-term, negligible to minor, direct, adverse effects on the natural gas system would be expected during construction associated with the proposed projects. Short-term electrical interruptions could be experienced when buildings are disconnected from or connected to the Grand Forks AFB natural gas system. Long-term, negligible to minor, beneficial effects would be realized from the HVAC upgrades due to reduced costs of heating and cooling. The Proposed Action would result in a negligible to minor change in natural gas demands at the installation. However, the discontinuation of natural gas services would be temporary and coordinated with area users prior to disconnection.

Liquid Fuel. Short-term, negligible, adverse effects on the liquid fuel systems would be expected from the Proposed Action. Short-term interruptions could be experienced when buildings are disconnected from or connected to the Grand Forks AFB liquid fuel supply system. However, the discontinuation of liquid fuels would be temporary and coordinated with area users prior to disconnection.

Energy. Long-term, beneficial impacts would be expected on energy at Grand Forks AFB from the Proposed Actions. By implementation of the Proposed Actions, Grand Forks AFB aims to meet the requirements of the *Energy Policy Act* and *EO Federal Leadership in Environmental, Energy, and Economic Performance*. Older facilities would be replaced with more energy-efficient facilities, and the installation of HVAC-GSHPs at certain locations to replace the older HVAC system would be beneficial on energy consumption.

Water Supply. Short-term, negligible, adverse effects on the water supply systems would be expected from the Proposed Action. Short-term interruptions could be experienced when buildings are disconnected from or connected to the Grand Forks AFB water supply system. Water necessary for construction would be obtained from the Grand Forks AFB water supply system. Construction water needs would be very limited and have little effect on the installation's water supply system. Water supply is available in all areas associated with the Proposed Action. However, the discontinuation of water supply system would be temporary and coordinated with area users prior to disconnection. The Proposed Action would result in a negligible change in demand for potable water.

Sanitary Sewer and Wastewater Systems. Short-term, negligible, adverse effects on the sanitary sewer and wastewater systems would be expected from the Proposed Action. Short-term interruptions could be experienced when buildings are disconnected from or connected to the sanitary sewer and wastewater systems. Sanitary sewer service is available in all areas of the Proposed Action. However, the discontinuation of the sanitary sewer and wastewater system would be temporary and coordinated with area users prior to disconnection. The Proposed Action would result in a negligible change in demand for sanitary sewer and wastewater systems use.

Storm Water Systems. Long-term, negligible, adverse effects on the Grand Forks AFB storm water system would be expected as a result of an increase in impervious surfaces associated with the Proposed Action. Under the DHEWQ, all construction sites disturbing more than 1 acre and industrial sites are required to obtain and meet the requirements of the NDPDES permit coverage. Proposed pavement resurfacing or repair projects would not result in an increase in impervious surfaces but would still cause ground disturbances. Short-term, adverse impacts would be expected on storm water systems resulting from these types of projects. Long-term, negligible, beneficial effects would be realized from the repair of storm drainage in Military Family Housing.

Communications. Short-term, negligible, adverse effects on the communications systems at Grand Forks AFB would be expected from the Proposed Action. Short-term interruptions could be experienced when buildings are disconnected from and connected to the communications systems. However, the

discontinuation of communications systems would be temporary and coordinated with area users prior to disconnection. Grand Forks AFB upgrades the communications system on the installation as needed.

Solid Waste Management. Short-term, minor, direct, adverse effects would result from increased construction and demolition debris production. Solid waste generated from the proposed construction and demolition activities would consist of building materials such as solid pieces of concrete, metals (e.g., conduit, piping, and wiring), and lumber. Contractors would be required to recycle construction and demolition debris to the maximum extent practicable as part of installation policy, thereby diverting it from landfills. This is a short-term, adverse effect in that debris would only be generated during construction activities; however, debris that is not recycled would be sent to the landfill, and that waste would be considered a long-term, irreversible adverse effect. The contractor would dispose of nonrecyclable construction and demolition debris at an off-site permitted landfill facility. Grand Forks Municipal Landfill and Berger Enterprises have sufficient capacity to handle projected waste streams from the Proposed Actions. Grand Forks Municipal Landfill has the capacity to handle up to 350 tons of municipal waste per day while Berger Enterprises has the ability to handle the inert waste that would be produced from the projects associated with the Proposed Action (NDDH 2009a, Berger 2009). Construction and demolition activities have the capability of producing up to 111,480 tons of debris from the Proposed Action (USEPA 2009b).

Pollution Prevention. It is anticipated that the Proposed Action would not affect the Pollution Prevention Program at Grand Forks AFB. The installation's pollution prevention plans discussed in **Section 3.8.2** aim to minimize waste and meet the requirements of the CWA during construction and demolition activities. Quantities of hazardous materials and chemical purchases, off-installation transport of hazardous waste, disposal of solid waste, and energy consumption would continue. Operation of new facilities under the Proposed Action would require procurement of products containing hazardous materials, generation of hazardous waste, and consumption of energy consistent with the existing conditions.

Implementation of all proposed projects would be expected to result in long-term, beneficial effects on infrastructure systems by providing the required airfield, road, and utilities upgrades to support existing and future missions. However, demolition, construction, and infrastructure projects would also result in adverse effects as a result of increased solid waste generation. As indicated in **Table 4-4**, approximately 111,480 tons would be generated over the next 5 years from implementing the Proposed Action (USEPA 2009b). Clean demolition and construction debris (e.g., concrete, asphalt) would be ground, recycled, and used for fill and road work rather than disposed of in a landfill, which would meet some Leadership in Energy and Environmental Design (LEED) requirements for construction.

4.3.10 Hazardous Materials and Waste

Hazardous Materials. Short term, minor, adverse impacts would be expected. Construction, demolition, and renovation activities would require the use of certain hazardous materials such as paints, welding gases, solvents, preservatives, and sealants. It is anticipated that the quantity of products containing hazardous materials used during construction, demolition, and renovation activities would be minimal and their use would be of short duration. Contractors would be responsible for the management of hazardous materials and petroleum products, which would be handled in accordance with Federal, state, and USAF regulations. Contractors would report the use of hazardous materials to the Grand Forks AFB hazardous materials pharmacy (HAZMART) including pertinent information (e.g., MSDSs) in an effort to mitigate any potential impacts from hazardous materials.

Hazardous Wastes. Short- and long-term, minor, adverse impacts would be expected. The quantity of hazardous wastes generated from construction, demolition, and renovation activities would be minor and

would not be expected to exceed the capacities of existing hazardous waste disposal facilities. Hazardous wastes generated during operation of the proposed projects would be continual and minor and would not be expected to exceed the capacities of existing hazardous waste disposal facilities. Contractors would be responsible for the disposal of hazardous wastes in accordance with Federal, state, and local regulations. Contractors would also be required to follow the Hazardous Waste Management Plan for Grand Forks AFB.

Table 4-4. Anticipated Generation of Construction and Demolition Debris

Proposed Projects Addressed in this IDEA	Project Size (ft ²)	Multiplier (pounds/ft ²)	Total Waste Generated	
			Pounds	U.S. Tons
Demolition	269,861	158	42,638,038	21,319
Construction	1,785,015	4.34	7,746,965	3,874
Pavement Repair and Demolition *	2,651,157	65	172,325,205	86,163
Pavement Construction	247,502	1	247,502	124
			Total	111,480

Sources: USEPA 2009b, Murphy and Chaterjee 1976

Note: * Calculated using standard asphalt density.

Aboveground and Underground Storage Tanks. No impacts would be expected. There are no known open leaking UST cases at or within the vicinity of the proposed project site. If any petroleum-contaminated soil was subsequently discovered during construction, demolition, or renovation activities, the contractor would be required to immediately stop work, report the discovery to the installation, and implement the appropriate safety precautions. Commencement of field activities could not continue in the area until the issue was investigated. Any USTs or ASTs within the proposed project areas are not anticipated to be impacted by the Proposed Action and would continue to be used with appropriate BMPs in place (i.e., secondary containment, leak detection systems, and alarm systems). Updated site-specific information regarding USTs and ASTs within the proposed project areas would be obtained prior to commencement of construction, demolition, and renovation activities.

Asbestos-Containing Material. Short-term, minor, adverse impacts could be expected. Grand Forks AFB maintains a record of ACM maintenance and abatement. Buildings scheduled for demolition or renovation could contain ACM and, therefore, would need to be surveyed for asbestos by a certified contractor prior to commencement of demolition or renovation activities. Demolition and renovation plans would be reviewed by Grand Forks AFB civil engineering personnel to ensure appropriate measures were taken to reduce potential exposure to, and release of, asbestos. All ACM discovered would be removed prior to demolition and renovation and disposed of at a USEPA-approved landfill. Grand Forks Landfill is the closest Municipal Solid Waste Landfill that accepts asbestos-contaminated construction debris. Contractors would be required to adhere to all Federal, state, and local regulations in addition to Grand Forks AFB management plans.

USAF regulations restrict the use of ACM for new construction. AFI 32-1023 requires that a substitution study be conducted whenever the use of an ACM in construction, maintenance, or repair is considered. If it is determined that the ACM is superior in cost and performance characteristics, and has minimal actual or potential health hazards, then the ACM should be used. In all other cases non-ACM should be utilized.

Lead-Based Paint. Short-term, minor, adverse impacts could be expected. Grand Forks AFB maintains a record of LBP maintenance and abatement. Buildings scheduled for demolition or renovation could contain LBP and, therefore, would need to be surveyed by a certified contractor prior to demolition or renovation activities. Facilities containing LBP can be demolished without removing the LBP; however, all LBP-contaminated construction debris would be disposed of at a USEPA-approved landfill. Grand Forks Landfill is the closest Municipal Solid Waste Landfill that accepts LBP-contaminated construction debris. Contractors would be required to adhere to all Federal, state, and local regulations in addition to Grand Forks AFB management plans.

Polychlorinated Biphenyls. Short-term, minor, adverse impacts could be expected. All major equipment, components, and transformers with PCB concentrations of 50 ppm or greater have been removed from service or are refilled with non-PCB oils at Grand Forks AFB. Any light fixtures and any other items not labeled PCB-free or missing date-of-manufacture labels discovered within the facilities proposed for demolition or renovation would be removed and handled in accordance with Federal and DOD regulations and the installation's Hazardous Waste Management Plan. PCB-containing materials would be transported off-installation and disposed of at a hazardous waste disposal facility.

Pesticides. No impacts would be expected. The proposed projects would not require any change in the quantities of pesticides used or significantly alter pesticide application areas. In accordance with the installation's Integrated Pest Management Plan, Grand Forks AFB utilizes the least toxic method for controlling pests encountered at the installation. Future pesticide applications at the proposed project sites would be conducted according to Federal, state, and local regulations and the installation's Pest Management Plan.

Environmental Restoration Program. Short-term, negligible to minor, adverse impacts would be expected. Some of the proposed projects are adjacent to active ERP sites; therefore, there is a potential for workers to encounter contamination during construction and demolition activities. If contaminated groundwater or soil from nearby ERP sites is encountered during construction or demolition activities, the handling, storage, transportation, and disposal of hazardous substances would be conducted in accordance with applicable Federal, state, and local regulations; USAF regulations; and Grand Forks AFB management procedures. Prior to commencement of construction and demolition activities at or within the vicinity of active ERP sites, a health and safety plan should be prepared in accordance with OSHA regulations. Workers performing soil-removal activities within ERP sites would be required to obtain OSHA 40-hour Hazardous Waste Operations and Emergency Response training. In addition, supervisors would be required to obtain an OSHA Site Supervisor Certification. Project planning would include protection of ERP infrastructure such as monitoring wells, treatment systems, and conveyance pipes to avoid disruption of clean-up activities and minimize potential impacts on ERP infrastructure.

4.3.11 Safety

Construction Site Safety. Short-term, minor, adverse effects could occur from implementation of the Proposed Action. The short-term risk associated with construction contractors would slightly increase at Grand Forks AFB during the normal workday as construction activity levels would increase. However, all construction contractors are required to follow and implement OSHA standards to establish and maintain safety procedures. Projects associated with the Proposed Action would not pose new or unacceptable safety risks to installation personnel or activities at the installation. The proposed projects would enable 319 ARW to meet future mission objectives at the installation and conduct or meet mission requirements in a safe operating environment. No long-term effects on safety would be expected.

Construction workers could encounter contamination as a result of an ERP site, or from contact with ACM and LBP. Projects that are near or within ERP sites increase the potential for construction workers

to encounter contamination. A health and safety officer should be present during groundbreaking activities for these projects. If contamination is encountered, it would be handled, stored, transported, and disposed of in accordance with applicable Federal, state, and local regulations.

Most of the buildings set for demolition were built before 1972 and would be expected to contain ACM and LBP. Long-term, beneficial effects on safety would also be experienced from the removal of ACM and LBP materials thus reducing exposure to personnel. Short-term, adverse impacts could be experienced but adherence to all Federal, state, and local regulations and Grand Forks AFB management plans would result in negligible effects on safety during demolition, construction, and infrastructure activities.

Demolition, construction, and infrastructure activities would be accomplished in accordance with Federal, state, and local regulations to minimize hazards associated with hazardous materials, wastes, and substances. These hazards are discussed in more detail in **Section 4.3.10**.

Explosives and Munitions Safety. Short-term, minor, adverse effects could occur during construction activities within the existing QD arcs. Contractors working within a QD arc would be exposed to an increased risk of potential explosions. No handling or transportation of munitions would occur within QD arcs while construction workers are within these areas. This would minimize explosive safety risks to construction workers. Any construction activities within the existing munitions storage area or explosive ordnance disposal (EOD) training area should be monitored for potential unexploded ordnance. All projects located within QD arcs would be mission-necessary and consistent with current land uses inside established QD arcs.

Projects expected to result in long-term, beneficial effects on explosives and munitions safety include the following: Demolish MSA Revised Plan (Project D1) and Construct Integrated Munitions Maintenance Facility (Project C8). The new munitions facility would increase munitions storage capacity with newer, safer storage facilities. The QD arcs for the munitions storage area would decrease following demolition and construction activities. See **Section 4.4** for analysis of the proposed demolition and construction in the munitions storage area.

Section 4.4.4 identifies several projects with potential safety concerns. Some proposed projects are identified as being within or very near QD arcs. Munitions transport would not occur during construction activities to minimize construction workers' exposure to explosive safety hazards. Grand Forks AFB proposes the following projects: Demolish MSA Revised Plan (Project D1) and Construct Integrated Munitions Maintenance Facility (Project C8). This combination of projects would result in long-term, beneficial effects by increasing the amount of munitions that can be stored without increasing QD arcs.

4.4 Detailed Environmental Consequences of the Proposed Action

4.4.1 Representative Demolition Projects

4.4.1.1 D1. Demolish MSA Area Revised Plan (Buildings 712, 717, 719, 723 to 727, 729, 737, and 738)

Project D1 would involve demolishing 11 buildings in the MSA, totaling 135,643 ft². The purpose of demolishing these buildings is to remove excess facilities and infrastructure within the MSA that are no longer needed, improve overall safety in MSA area, and remove representative sources of potential contamination. Known environmental constraints in relation to D1 are shown in **Figure 4-1**. In addition, the following provides a detailed environmental resource analysis of Project D1.

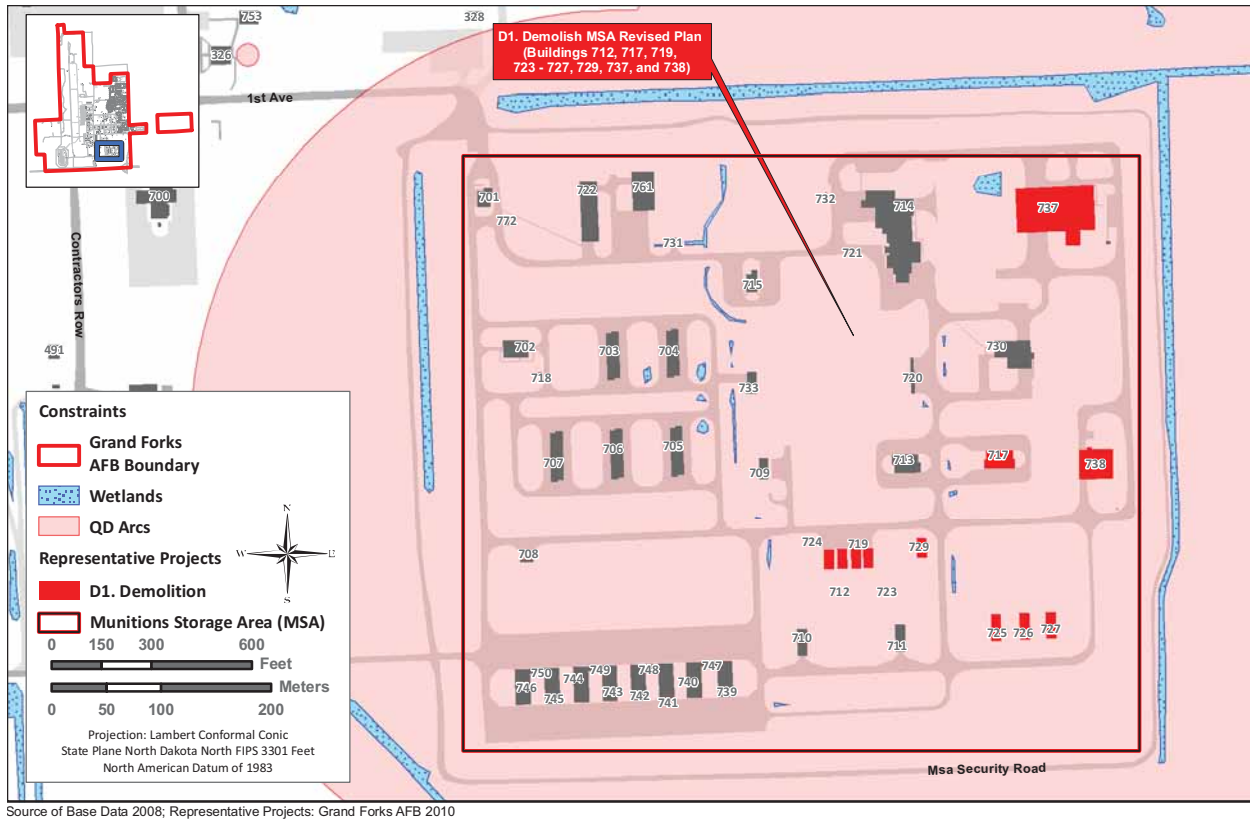


Figure 4-1. Environmental Constraints Associated with Project D1

Noise. Short-term, minor, adverse effects on the noise environment would be expected as a result of the demolition of these buildings. The noise emanating from construction equipment would be localized, short-term, and intermittent during machinery operations. **Table 4-1** shows the predicted noise levels for various pieces of construction equipment operating at 50 feet from the source, and **Table 3-2** shows estimated noise levels that would be expected at varying distances from a demolition site. Heavy construction equipment would be operated periodically during demolition; therefore noise levels from the equipment would fluctuate throughout the day. The proposed demolition would be expected to result in noise levels comparable to those indicated in **Table 3-2**. The area where proposed demolition activities would occur consists of open space and is used for industrial purposes. Populations potentially affected by increased noise levels would include mainly USAF personnel in buildings 500 feet north and 1,000 feet west of the closest proposed demolition site. Expected noise levels would be comparable to a noisy urban neighborhood (approximately 74 dBA, refer to **Figure 2-2** and **Table 3-2**).

No change in operations would be expected as a result of the demolition of these buildings; therefore, no long-term effects on the ambient noise environment are anticipated.

Land Use. Long-term, minor, beneficial effects would be expected from the project Demolish MSA Revised Plan (Project D1). Demolition activities would have beneficial effects on the installation's organizational functions by removing old, outdated, and unnecessary facilities and creating space for future projects. The construction of new facilities where land has been made available by demolition reduces the amount of undisturbed land required for future development. The demolition of these facilities, which are currently within the Industrial land use category, would make 135,643, ft² of land available for the construction of new industrial facilities. Present land use and future land use of the area, which is also designated as Industrial, would not change, and would be compatible with adjacent land that consists of both Industrial and Open Space.

Air Quality. Short-term, minor, adverse impacts would be expected from demolition emissions and land disturbance. The Proposed Action would result in minor impacts on regional air quality during demolition activities, primarily from site-disturbing activities and operation of construction equipment. Appropriate fugitive dust-control measures would be employed during demolition activities to suppress emissions. All emissions associated with demolition operations would be temporary in nature. It is not expected that emissions from the project Demolish MSA Revised Plan (Buildings 712, 717, 723 to 729, 737, and 738) would contribute to or affect local or regional attainment status with the NAAQS. Emissions from the Proposed Action are summarized in **Table 4-5**. Emissions estimation spreadsheets and summary of the methodology used are included in **Appendix C**.

Table 4-5. Estimated Air Emissions Resulting from Project D1

Activity	NO _x tpy	VOC tpy	CO tpy	SO ₂ tpy	PM ₁₀ tpy	PM _{2.5} tpy	CO ₂ tpy
Construction Combustion	1.041	0.062	0.412	0.021	0.063	0.061	121.284
Construction Fugitive Dust	--	--	--	--	0.366	0.018	--
Haul Truck On-Road	--	--	--	--	--	--	--
Construction Commuter	0.028	0.027	0.248	< 0.001	0.003	0.002	32.870
Total D1 Emissions	1.069	0.089	0.659	0.021	0.431	0.081	154.155
Percent of AQCR 172 Inventory	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001 *

Note: * Percent of State of North Dakota CO₂ emissions.

Geological Resources. The project Demolish MSA Revised Plan would be expected to result in short-term, minor, adverse and long-term, beneficial effects on geological resources. Soils previously were disturbed in this area when buildings were initially constructed. Short-term effects could involve compaction of surrounding soils under the weight of construction equipment. Soil erosion and transfer in storm water runoff could result because of compaction of soil due to vehicle use, foot traffic, and removal of vegetation. Adverse impacts would be minimized with implementation of BMPs, including wetting of soils, and implementation of erosion and storm water management practices to contain soil and runoff onsite. Berming along nearby water bodies would decrease the amount of potential sedimentation in adjacent water bodies. Wetting of soils would occur on a daily basis as needed to prevent erosion and generation of dust (see discussion in **Section 4.4.1.1**, Air Quality).

Long-term effects of demolishing 11 buildings would be beneficial as the land would be revegetated, and soil erosion and sedimentation rates would decrease. The decrease in impervious surfaces associated with removal of structures would be expected to reduce volume and velocity of storm water runoff and associated potential erosion and offsite transport of sediments. Please see discussion on water resources.

Water Resources. The project Demolish MSA Revised Plan would be expected to result in short-term, minor, adverse and long-term, beneficial effects on water resources. Short-term effects could involve soil erosion and sedimentation of receiving water bodies, and removal of vegetation. Adverse impacts would be minimized with implementation of BMPs in accordance with the CWA Final Rule (see **Section 3.5.1**) including wetting of soils, and implementation of erosion and storm water management practices to contain soil and runoff onsite. Berming along nearby water bodies would decrease the amount of potential sedimentation in adjacent water bodies.

It is possible that construction equipment could leak or spills could occur during demolition activities. In the event of a spill or leak of fuel or other contaminants, there could be adverse effects on the receiving water bodies. All fuels and other potentially hazardous materials would be contained and stored appropriately. In the event of a spill, procedures identified in the installation's SPCC Plan would be followed to quickly contain and clean up a spill. Please see **Section 4.4.1.1**, hazardous materials and wastes. There remains the possibility that a spill or leak could occur, but implementation of the BMPs identified in the SPCC Plan would minimize the potential for and extent of associated contamination.

Initially, the decrease in impervious surfaces associated with removal of structures would be expected to reduce volume and velocity of storm water runoff and associated potential erosion and offsite transport of sediments. This decrease would result in improved water quality, and less turbid water as sedimentation decreases. A decrease in impervious surfaces and an associated increase in soil permeability and water infiltration can also increase the rate and volume of groundwater recharge in the affected area. However, it is likely that this area would be redeveloped. Storm water BMPs would ultimately attenuate the potential adverse effects the Proposed Action could have on water quality and quantity.

Demolition activities would not occur within or adjacent to floodplains, and no effects on floodplains would be expected. No changes to wetland hydrology would be expected from demolishing the buildings associated with the MSA Revised Plan. Project D1 would also include demolition of some surrounding pavements. Project D1 demolition activities would stay within existing footprints and would follow environmental protection measures and BMP requirements as outlined in **Appendix F**. By implementing environmental protection measures and BMPs as outlined in **Appendix F**, no adverse impacts on adjacent wetlands or waters of the United States would occur. No effect on water supply or quality would be expected.

Biological Resources. Impacts from demolishing buildings within the MSA area would be expected to be short-term, negligible to minor, and long-term, negligible.

Vegetation. Short-term, negligible, adverse effects on vegetation would be expected from the demolition of buildings within the MSA area due to temporary disturbances (e.g., trampling and removal) of vegetation on adjoining lands and from use of heavy equipment during demolition activities. Although this vegetation would be expected to regenerate once demolition activities have ceased, it is likely that this area would be redeveloped. The vegetation within the MSA area is composed of regularly mowed mixed prairie and landscaping grasses; therefore, effects from removal or damage to this vegetation would be negligible as this vegetation is not unique or rare within the installation or in the region.

Wildlife. Short-term, negligible, adverse effects on wildlife would be expected from the demolition of buildings within the MSA area due to temporary disturbances from noise, demolition activities, and heavy equipment use. High noise events could cause wildlife to engage in escape or avoidance behaviors, resulting in short-term, negligible, adverse effects. The areas of disturbance would be relatively small in size and in a developed area where disturbances are common. Therefore, wildlife in the vicinity would be expected to be habituated to frequent disturbances. Most wildlife species in the vicinity of demolition activities would be expected to quickly recover once the demolition noise and disturbances have ceased; therefore, no long-term, adverse effects on wildlife would be expected.

Protected and Sensitive Species. Indirect, short-term, negligible to minor, adverse effects on protected and sensitive species would be expected from demolition of buildings within the MSA area due to temporary disturbances from noise, demolition activities, and heavy equipment use. High noise events could cause these species to engage in escape or avoidance behaviors, resulting in short-term, negligible, adverse effects. Short-term, minor, adverse effects could be expected if demolition activities prevented or disturbed nesting activities by state-listed or migratory birds. There is no critical habitat designated

within Grand Forks AFB and no direct effects on protected or sensitive species would be expected. Adherence to BMPs outlined in **Section 4.3.6, Protected and Sensitive Species** (e.g., perform groundbreaking activities outside of nesting season), would minimize indirect impacts on state-listed and migratory birds. As no habitat would be permanently disturbed or removed from the proposed project, no long-term adverse effects on protected and sensitive species would be expected. Long-term, negligible, beneficial effects on protected and sensitive species could be expected from the demolition of buildings within the MSA area due to an anticipated larger proportion of native habitat cover in the area once demolition has ceased and the sites have been revegetated.

Wetland Habitat. The buildings proposed for demolition within the MSA area do not occur within wetlands; therefore, no direct impacts on wetlands would be expected from this proposed demolition project. Small jurisdictional pothole wetlands are scattered throughout the MSA area. However, all demolition activities would be contained within existing footprints and no adverse effects on wetlands adjacent to facilities and pavements scheduled for demolition would occur as a result of the Proposed Action. Adherence to an ESCP and SWPPP should prevent surface water degradation. Assuming appropriate BMPs are implemented during demolition activities, no adverse effects on receiving wetlands would be expected. In the event of a spill, procedures outlined in Grand Forks AFB's SPCC Plan would be followed to quickly contain and clean up a spill (see **Sections 3.10** and **4.3.10** for discussions on hazardous materials and wastes).

Cultural Resources. Long-term, negligible to minor effects on cultural resources would be anticipated from demolishing Buildings 712, 717, 719, 723 to 727, 729, 737, and 738. These buildings are located in the MSA area, where five potentially NRHP-eligible resources (Buildings 703 to 707) and one NRHP-eligible resource (Building 714) are located. Buildings 703 to 707 are Cold War-era ammunition storage facilities covered under the 2006 PC. Building 737 was deemed ineligible for NRHP listing with North Dakota SHPO concurrence in 1999. Building 717 will become 50 years old in 2010. The other buildings listed for demolition under this project were not considered for evaluation in the 1996 Cold War Resource Inventory due to insufficient significance to qualify under Criterion Consideration G. Additionally, North Dakota SHPO concurred with a "No Historic Properties Affected" determination for the proposed demolition of 35 buildings in the MSA in 2008, but still considers Buildings 703 to 707 and 714 as eligible for the NRHP (NDSHS 2008, Quinnell 2010). Short-term effects during the period of demolition could include dust, noise, and vibration. However, none should persist after construction is completed. The demolition could affect the historic setting of Buildings 703 to 707 and 714. Potentially NRHP-eligible Buildings 703 to 707 and unevaluated Buildings 712, 717, 719, and 723 to 727 are all of qualifying types covered under the 2006 ACHP PC regarding Cold War-era ammunition storage bunkers and Section 106 consultation obligations should be met for undertakings affecting these resources. Under this PC, the USAF has fulfilled its Section 106 requirements for covered facilities, thus it does not need to consult on a case-by-case basis for undertakings, including demolition activities. The USAF, however, would inform the North Dakota SHPO of its use of the PC. The SHPO has concurred with a "No Historic Properties Affected" determination for Building 714 as mitigation for demolition has been completed. The SHPO concurs Buildings 712, 717, 719, 723 through 727, 729, 737, and 751 are not eligible and therefore concur with a "No Historic Properties Affected" determination (NDSHS 2010). Any consultations with the North Dakota SHPO for Building 738 would be completed prior to finalizing this IDEA. **Appendix F** contains all SHPO and Section 106 consultation correspondence related to this project.

There are no known NRHP-eligible archaeological sites in the APE for this project and no archaeological resources would be affected by the action. No previous archaeological surveys have been conducted in the MSA; however due to previous ground disturbance the probability of buried cultural resources is low. If cultural materials or human remains are discovered inadvertently during construction, Grand Forks

AFB would take appropriate actions to protect or minimize impacts in compliance with Federal laws and regulations as outlined in the ICRMP for Grand Forks AFB.

This project would not involve disturbance of any previously undisturbed land and, therefore, would not have a direct impact on resources of traditional, religious, or cultural significance to Native American tribes. If resources of traditional, religious, or cultural significance to Native American tribes are identified in the vicinity of the project area, Grand Forks AFB would avoid, minimize, or mitigate any impacts from the Proposed Action on those resources.

Socioeconomics and Environmental Justice. Short-term, minor, beneficial effects on socioeconomic resources would be expected from the project Demolish MSA Area Revised Plan. While it is assumed that local machinery would be sourced and local contractors would be used, some of the demolition could be completed by soldiers stationed at Grand Forks AFB. The demand for workers as part of the demolition would be minor and should not outstrip the local supply of workers as there are approximately 5,000 construction workers in the Grand Forks MSA (USCB 2000). Demolition activities would occur entirely on Grand Forks AFB and would have little potential to adversely affect off-installation residents as noise associated with demolition and the deposition of demolished materials would occur on-installation; therefore, no environmental justice issues would be anticipated. No long-term effects on socioeconomic resources or environmental justice are expected to result from the demolition of the buildings in the MSA Area Revised Plan.

Infrastructure. Negligible effects on infrastructure resources would be expected from the demolition of Buildings 712, 717, 719, 723 to 727, 729, 737, and 738. Removal of these facilities would result in less demand for certain utilities, but this reduction would be negligible when compared with total installation usage. Long-term, beneficial effects would be realized from the removal of outdated utilities (e.g., electrical and communications lines). Long-term, beneficial effects on storm water systems would be expected from the decrease in impervious surfaces.

Short-term, adverse effects would be expected as a result of the generation of approximately 4,417 tons of demolition debris (USEPA 2009b). This is a short-term, adverse effect as debris would only be generated during the demolition activities; however, debris that is not recycled would be landfilled, which would be considered a long-term, irreversible, adverse effect.

Hazardous Materials and Waste. No long-term effects on hazardous materials management or hazardous waste generation would be expected as a result of the proposed project Demolish MSA Revised Plan (Buildings 712, 717, 719, 723 to 727, 729, 737, and 738). However, because of their age, these buildings should be assumed to contain both ACM and LBP and might contain pad-mounted transformers, capacitors, surge protectors, or light ballasts containing PCBs. Sampling for ACM, PCB, and LBP should occur prior to any demolition activities so that these materials can be properly characterized, handled, and disposed of in accordance with the Grand Forks AFB *Asbestos Management Program Plan* (GFAFB 2008d), *Lead-Based Paint Management Plan* (GFAFB 2003c), *Hazardous Waste Management Plan* (GFAFB 2008c), and USAF policy.

Contractors would be responsible for the management of hazardous materials and petroleum product usage, which would be handled in accordance with Federal, state, and USAF regulations. Contractors must report the use of hazardous materials to the HAZMART, including pertinent information (e.g., MSDSs). If a material that is less hazardous can be used, the HAZMART should make these recommendations. Use of the HAZMART would also ensure that ozone-depleting substances (ODSs) are not available for use. Use of ODSs in such products as refrigerants, aerosols, and fire suppression systems is not permitted by the DOD without a formal request by waiver.

Safety. Short-term, minor, adverse effects could occur. Demolition activities pose an increased risk of construction-related accidents, but this level of risk would be managed by adherence to established OSHA, USEPA, and USAF safety regulations.

Because of their ages, Buildings 712, 717, 719, 723 to 727, and 729 should be assumed to contain ACM and LBP; these materials require appropriate removal, handling, and disposal during demolition activities by qualified personnel. Long-term, beneficial effects on safety would also be experienced from the removal of ACM and LBP materials.

Demolition activities would occur within the Munitions Storage Area. Munitions transport would not occur during demolition activities to minimize construction workers' exposure to explosive safety hazards. Demolition of buildings within the MSA plan would also result in long-term, negligible, beneficial effects on safety because the project would result in removal of substandard munitions facilities to create space for more reliable munitions storage facilities in the future.

4.4.1.2 D2. Demolish Buildings 304 and 515 in support of Construct Consolidated Security Forces

This project involves demolishing Buildings 304 and 515, totaling 22,631 ft² in support of constructing a Consolidated Security Forces facility (see Project C1). The purpose of this project would be to consolidate operations into a single facility to improve command and control, response times to emergency situations, and to support the entire installation in law enforcement and security operations. Known environmental constraints in relation to D2 are shown in **Figure 4-2**. In addition, the following provides a detailed environmental resource analysis of Project D2.

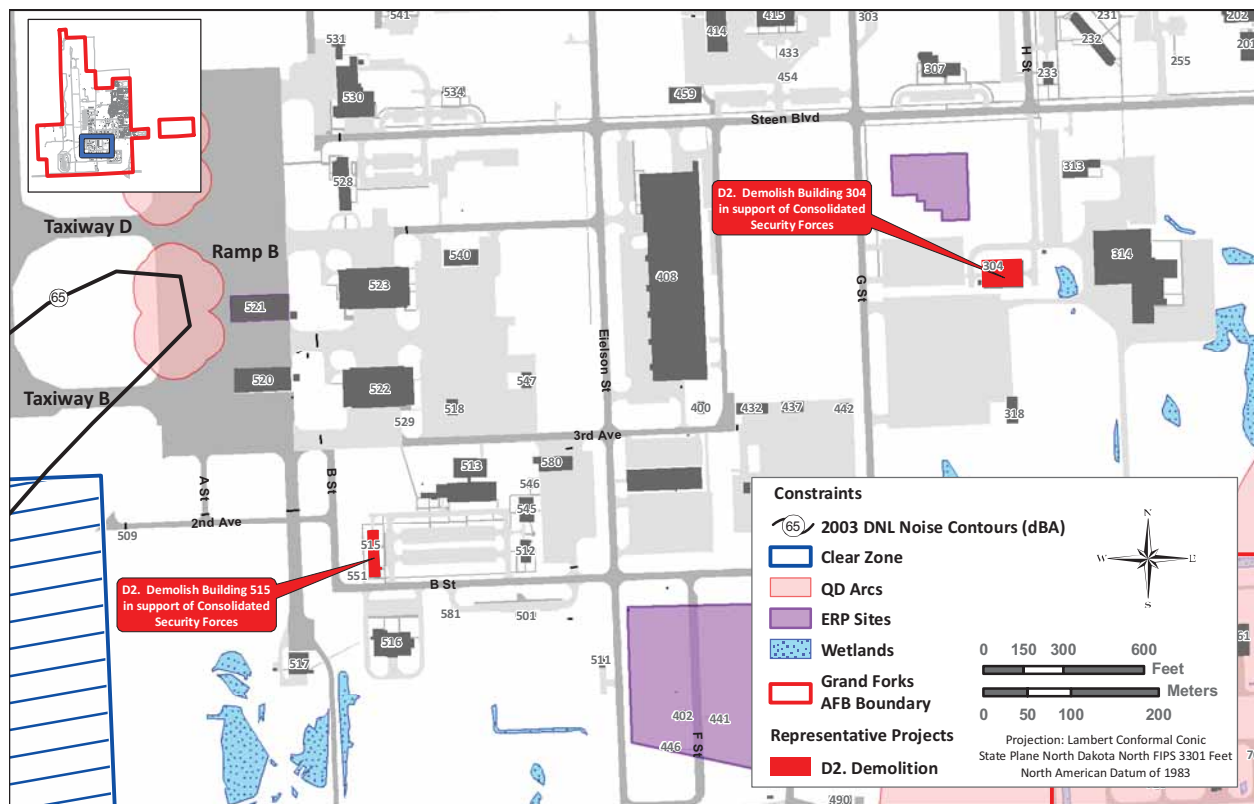


Figure 4-2. Environmental Constraints Associated with Project D2

Noise. Short-term, minor, adverse effects on the noise environment would be expected as a result of the demolition of these buildings. The noise emanating from construction equipment would be localized, short-term, and intermittent during machinery operations. Heavy construction equipment would be operated periodically during demolition; therefore, noise levels from the equipment would fluctuate throughout the day. This area of Grand Forks AFB consists of open space and is used for industrial and administrative purposes; populations potentially affected by increased noise levels would primarily include USAF personnel in buildings approximately 200 feet (Building 515) and 500 feet (Building 304) from the proposed demolition sites. Expected noise levels would be comparable to a very noisy urban area (approximately 82 dBA).

No change in operations would be expected as a result of the demolition of these buildings; therefore, no long-term effects on the ambient noise environment are anticipated

Land Use. Long-term, minor, beneficial effects would be expected from demolition of Buildings 304 and 515. Demolition activities would have beneficial effects on the installation's organizational functions by removing old, outdated, and unnecessary facilities and allowing the Security Forces Squadron (SFS) to consolidate in a new more centrally located facility (Consolidated Security Forces facility [Project C1]). Building 515, the existing SFS command facility, does not meet current standards and is too far from the central portion of the installation (USAF 2006). The land made available by demolition of Buildings 304 and 515 would also reduce the amount of undisturbed land required for future industrial development by 22,631 ft². Buildings 304 and 515 are currently within the Industrial land use category, and the land use category would not be anticipated to change. The present and future land use categories would be compatible with the surrounding Industrial land uses.

Air Quality. Short-term, minor, adverse impacts would be expected from demolition emissions and land disturbance. Demolition of Buildings 304 and 515 would result in minor impacts on regional air quality during demolition activities, primarily from site-disturbing activities and operation of construction equipment. Appropriate fugitive dust-control measures would be employed during demolition activities to suppress emissions. All emissions associated with demolition operations would be temporary in nature. It is not expected that emissions from demolition of Buildings 304 and 515 in support of Construct Consolidated Security Forces would contribute to or affect local or regional attainment status with the NAAQS. Emissions from the Proposed Action are summarized in **Table 4-6**. Emissions estimation spreadsheets and summary of the methodology used are included in **Appendix C**.

Table 4-6. Estimated Air Emissions Resulting from Project D2

Activity	NO _x tpy	VOC tpy	CO tpy	SO ₂ tpy	PM ₁₀ tpy	PM _{2.5} tpy	CO ₂ tpy
Construction Combustion	0.434	0.026	0.171	0.009	0.026	0.025	50.568
Construction Fugitive Dust	--	--	--	--	0.099	0.005	--
Haul Truck On-Road	--	--	--	--	--	--	--
Construction Commuter	0.018	0.018	0.165	< 0.001	0.002	0.001	21.914
Total D2 Emissions	0.452	0.044	0.337	0.009	0.127	0.031	72.481
Percent of AQCR 172 Inventory	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001*

Note: * Percent of State of North Dakota CO₂ emissions.

Geological Resources. Effects from demolishing Buildings 304 and 515 would be similar to effects from demolishing the buildings associated with the MSA Area Revised Plan. Short-term, minor, adverse effects would be expected to occur during demolition activities when soils could be compacted, and erosion and sedimentation increases. Implementation of erosion and sediment control and storm water management BMPs would minimize adverse effects. If vegetation is reestablished, implementing this project would result in long-term, beneficial impacts as erosion and sedimentation rates decrease. However, it is likely that these sites would be redeveloped in the future. Although impervious surfaces would decrease from demolition of these two buildings, overall impervious surfaces would actually increase as the construction of a Consolidated Security Forces facility would result in an increase in impervious surfaces. Impervious surfaces would increase by 111,858 ft² as a result of demolition and construction projects associated with the construction of Consolidated Security Forces. Storm water management practices would be implemented to address increased runoff associated with the increase in impervious surfaces.

Water Resources. Effects from demolishing Buildings 304 and 515 would be similar to effects from demolishing the buildings associated with the MSA Revised Plan. Short-term, minor, adverse effects would be expected to occur during demolition activities as sedimentation and storm water runoff volume and velocity could increase. Additionally, construction equipment leaks or spills could be transported to receiving water bodies during storm events. BMPs would minimize adverse effects. If vegetation is reestablished, long-term, beneficial impacts would be expected as sedimentation and impervious surface cover decrease. However, it is likely that the sites would be redeveloped in the future. Storm water runoff velocity and volume would decrease, which could contribute to an increase in groundwater recharge. However, once the facility associated with the Consolidated Security Forces is constructed, impervious surfaces would increase overall. Buildings 304 and 515 are not within or adjacent to any floodplains, so floodplains would not be affected. However, Building 304 is adjacent to a wetland, and indirect effects from increased runoff or introduction of pollutants could enter the wetland, resulting in a degradation of water quality. Effects would be expected to be negligible to minor as the additional runoff or contaminants on site would be negligible and could be attenuated by following guidelines in an approved ESCP, SWPPP, and SPCC Plan.

Biological Resources. Effects on biological resources from demolishing Buildings 304 and 515 would be similar to the effects described for demolishing the MSA-area buildings. Effects would be expected to be short-term, minor, adverse and long-term, beneficial.

Vegetation. Adverse and beneficial effects on vegetation from the demolition of Buildings 304 and 515 would be similar to those described in **Section 4.4.1.1, Vegetation**. The vegetation within this area is landscaped vegetation; therefore, effects on vegetation from trampling or removal would be negligible as this vegetation is not unique or rare within the installation or the region.

Wildlife. Adverse and beneficial effects on wildlife from the demolition of Buildings 304 and 515 would be similar to those described in **Section 4.4.1.1, Wildlife**.

Protected and Sensitive Species. Adverse and beneficial effects on protected and sensitive species from the demolition of Buildings 304 and 515 would be similar to those described in **Section 4.4.1.1, Protected and Sensitive Species**.

Wetland Habitat. Buildings 304 and 515 do not occur within wetlands; therefore, no direct impacts on wetlands would be expected from this proposed demolition project. A small wetland with an undetermined jurisdictional status is just east of Building 515. Adherence to an ESCP and SWPPP should prevent surface water degradation. Assuming appropriate BMPs are implemented during demolition activities, no adverse effects on this wetland would be expected. In the event of a spill, procedures

outlined in Grand Forks AFB's SPCC Plan would be followed to quickly contain and clean up a spill (see **Sections 3.10** and **4.3.10** for a discussion on hazardous materials and wastes).

Cultural Resources. No historic properties would be expected to be affected by the demolition of Buildings 304 and 515. Building 515 was evaluated as ineligible for NRHP listing under Criterion Consideration G in the 1996 Cold War Resource Study. However, it has since reached 50 years of age and would need to be re-evaluated for significance, although it is not expected to be NRHP eligible due to historical insignificance. Consultation with the SHPO is in progress regarding Building 515. SHPO and Section 106 consultation would be completed prior to finalizing this IDEA and signing the FONSI.

Building 304 is less than 50 years old and was not evaluated in the 1996 study due to insufficient significance under Criterion Consideration G. Building 304 is about 350 feet from Building 313, an NRHP-eligible building; however, its location is sufficiently distant that it would not be impacted by the Proposed Action.

There are no known NRHP-eligible archaeological sites in the APE for this project and no archaeological resources would be affected by the action. No previous archaeological surveys have been conducted in the immediate area around Buildings 304 and 515, however due to previous ground disturbance the probability of buried cultural resources is low. If cultural materials or human remains are discovered inadvertently during construction, Grand Forks AFB would take appropriate actions to protect or minimize impacts in compliance with Federal laws and regulations as outlined in the ICRMP for Grand Forks AFB.

This proposed project would not involve disturbance of any previously undisturbed land and, therefore, would not have a direct impact on resources of traditional, religious, or cultural significance to Native American tribes. If resources of traditional, religious, or cultural significance to Native American tribes are identified in the vicinity of the project area, Grand Forks AFB would avoid, minimize, or mitigate any impacts from the Proposed Action on those resources.

Socioeconomics and Environmental Justice. Short-term, negligible, beneficial effects on socioeconomic resources would be expected from the proposed demolition of Buildings 304 and 515. While it is assumed that local machinery would be sourced and local contractors would be used, some of the demolition could be completed by soldiers stationed at Grand Forks AFB. The demand for workers as part of the demolition would be minor and should not outstrip the local supply of workers as there are approximately 5,000 construction workers in the GFMSA (USCB 2000). Demolition activities would occur entirely on Grand Forks AFB and would have little potential to adversely affect off-installation residents as noise associated with demolition and the deposition of demolished materials would occur on-installation; therefore, no environmental justice issues would be anticipated. No long-term effects on socioeconomic resources or environmental justice would be expected to result from the demolition of the buildings in the Buildings 304 and 515.

Infrastructure. Negligible effects on infrastructure would be expected from the demolition of Buildings 304 and 515. Removal of these facilities would result in a decreased demand for certain utilities, but this reduction would be negligible when compared with total installation usage. Short-term, adverse effects would be expected from the generation of approximately 1,788 tons of demolition debris (USEPA 2009b). This is a short-term, adverse effect in that debris would only be generated during the demolition activities; however, debris that is not recycled would be landfilled, which would be considered a long-term, irreversible, adverse effect.

Long-term, beneficial effects would be realized with the removal of outdated utilities. Long-term, beneficial impacts would be expected on storm water drainage systems. The amount of impervious surfaces would decrease and storm water permeation into the ground would increase, thereby permanently decreasing sheet flow runoff into the storm water drainage system.

Hazardous Materials and Waste. No long-term effects on hazardous materials management or hazardous waste generation would be expected as a result of the proposed demolition of Buildings 304 and 515. However, because of their age, the buildings could contain ACM, LBP, and PCBs. Sampling for these materials should occur prior to any demolition activities so that these materials can be properly characterized, handled, and disposed of in accordance with the Grand Forks AFB *Asbestos Management Program Plan* (GFAFB 2008d), *Lead-Based Paint Management Plan* (GFAFB 2003c), *Hazardous Waste Management Plan* (GFAFB 2008c), and USAF policy.

Contractors would be responsible for the management of hazardous materials and petroleum product usage, which would be handled in accordance with Federal, state, and USAF regulations. Contractors must report the use of hazardous materials to the HAZMART, including pertinent information (e.g., MSDS). If a material that is less hazardous can be used, the HAZMART should make these recommendations. Use of the HAZMART would also ensure that ODSs are not available for use. Use of ODSs in such products as refrigerants, aerosols, and fire suppression systems is not permitted by the DOD without a formal request by waiver.

Safety. Short-term, minor, adverse effects on safety at Grand Forks AFB could occur. Demolition activities pose an increased risk of construction-related accidents, but this level of risk would be managed by adherence to established OSHA, USEPA, and USAF safety regulations.

Because of their ages, Buildings 304 and 515 should be assumed to contain ACM and LBP (GFAFB 2008e); these materials require appropriate characterization, handling, and disposal during demolition activities by qualified personnel. Long-term, beneficial effects on safety would also be experienced from the removal of ACM and LBP materials thus reducing exposure to personnel.

4.4.1.3 D3. Demolish Hangars 520, 521, 522, and 523

Demolish Hangars 520, 521, 522, and 523 totaling 117,359 ft². The purpose of demolishing these hangar facilities is to remove outdated facilities and make room for future Unmanned Aircraft Systems (UAS) hangar and ramp apron expansion and infrastructure development. Known environmental constraints in relation to D3 are shown in **Figure 4-3**. In addition, the following provides a detailed environmental resource analysis of Project D3.

Noise. Short-term, minor, adverse effects on the noise environment would be expected as a result of the demolition of the four hangars. The noise emanating from construction equipment would be localized, short-term, and intermittent during machinery operations. Heavy construction equipment would be operated periodically during demolition; therefore noise levels from the equipment would fluctuate throughout the day. This area of Grand Forks AFB consists of open space and is used for industrial and aircraft operations and maintenance purposes; populations potentially affected by increased noise levels would include mainly USAF personnel in buildings approximately 50 feet or more from the proposed demolition sites. Expected noise levels would be comparable to a very noisy metropolitan area (approximately 94 dBA). No change in operations would be expected as a result of the demolition of these hangars; therefore, no long-term effects on the ambient noise environment are anticipated.

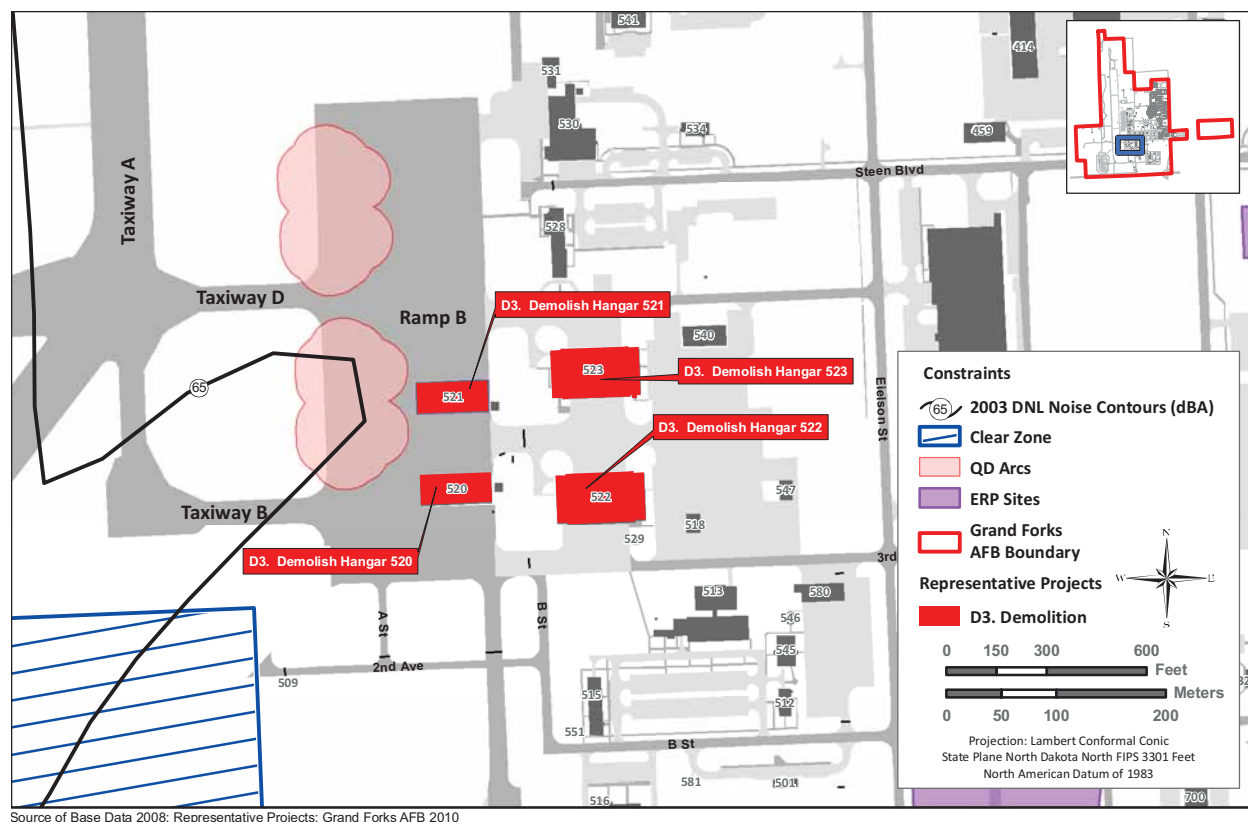


Figure 4-3. Environmental Constraints Associated with Project D3

Land Use. Long-term, minor, beneficial effects would be expected from demolition of Hangars 520, 521, 522, and 523. Demolition activities would have beneficial effects on the installation's organizational functions by removing old, outdated, and unnecessary facilities and allowing the SFS to consolidate in a new more centrally located facility (Construct Consolidated Security Forces [Project C1]). The land made available by demolition of Hangars 520, 521, 522, and 523 would also reduce the amount of undisturbed land required for future development by 117,359 ft². Hangars 520, 521, 522, and 523 are currently within the Industrial and Aircraft O&M land use categories, and these land use categories are not anticipated to change. Industrial and Aircraft O&M are functionally related and it is important that these uses are close for ease of transfer of cargo and other items (USAF 1998). Therefore, the present and future land use categories of this area would be compatible with one another and the surrounding Airfield, Aircraft O&M, and Industrial land uses. In addition, Hangars 520 and 521 are adjacent to two small QD arcs, and demolition of these facilities would ensure that fewer facilities are near the QD arcs.

Air Quality. Short-term, minor, adverse impacts would be expected from demolition emissions and land disturbance. Demolition of the four hangars would result in minor impacts on regional air quality during demolition activities, primarily from site-disturbing activities and operation of construction equipment. Appropriate fugitive dust-control measures would be employed during demolition activities to suppress emissions. All emissions associated with demolition operations would be temporary in nature. It is not expected that emissions from demolition of Hangars 520, 521, 522, and 523 would contribute to or affect local or regional attainment status with the NAAQS. Emissions from the Proposed Action are summarized in **Table 4-7**. Emissions estimation spreadsheets and summary of the methodology used are included in **Appendix C**.

Table 4-7. Estimated Air Emissions Resulting from Project D3

Activity	NO _x tpy	VOC tpy	CO tpy	SO ₂ tpy	PM ₁₀ tpy	PM _{2.5} tpy	CO ₂ tpy
Construction Combustion	2.184	0.130	0.863	0.044	0.132	0.128	254.361
Construction Fugitive Dust	--	--	--	--	1.792	0.090	--
Haul Truck On-Road	--	--	--	--	--	--	--
Construction Commuter	0.064	0.064	0.578	0.001	0.006	0.004	76.698
Total D3 Emissions	2.248	0.194	1.442	0.044	1.930	0.222	331.059
Percent of AQCR 172 Inventory	0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001	0.001*

Note: * Percent of State of North Dakota CO₂ emissions.

Geological Resources. Effects on geology and soils from demolishing Hangars 520 through 523 would be similar to effects described for the demolition of buildings associated with the MSA Area Revised Plan and Buildings 304 and 515. Short- and long-term, minor effects would occur resulting from a potential increase in soil erosion and sedimentation.

Water Resources. Effects on water resources from demolishing Hangars 520 through 523 would be similar to effects described for the demolition of buildings associated with the MSA Area Revised Plan and Buildings 304 and 515. Short- and long-term, minor effects would occur when soil erosion, sedimentation, and storm water runoff velocity and volume increase. BMPs would be incorporated in accordance with the CWA Final Rule (see **Section 3.5.1**).

Biological Resources. Short-term, negligible to minor, adverse effects from demolishing the four hangars would be expected on biological resources. Effects would be similar to those described for Projects D1 and D2, but no long-term effects would be expected as vegetation would not be reestablished.

Vegetation. Adverse effects on vegetation from the demolition of Hangars 520, 521, 522, and 523 would be similar, but less than, those described in **Section 4.4.1.1, Vegetation**. The existing vegetation within this area is landscaped and a large amount of land cover is paved; therefore, effects on vegetation from trampling or removal would be negligible as this vegetation is not unique or rare within the installation or the region.

Wildlife. Adverse effects on wildlife from the demolition of Hangars 520, 521, 522, and 523 would be similar to those described in **Section 4.4.1.1, Wildlife**. No long-term beneficial effects would be expected as the hangars are in a predominantly paved area and the sites are not anticipated to be planted with native vegetation once demolition is complete.

Protected and Sensitive Species. Adverse effects on protected and sensitive species from the demolition of Hangars 520, 521, 522, and 523 would be similar to those described in **Section 4.4.1.1, Protected and Sensitive Species**. No long-term beneficial effects would be expected as the hangars are in a predominantly paved area and the sites are not anticipated to be planted with native vegetation once demolition is complete.

Wetland Habitat. No demolition activities would occur within or adjacent to wetlands. Therefore, no effects on wetlands would be expected from the demolition of Hangars 520, 521, 522, and 523.

Cultural Resources. Effects from demolishing the four hangars would be expected to be long-term and negligible on cultural resources. Hangars 520, 521, 522, and 523 were constructed between 1957 and 1958 on the eastern side of the southern half of the runway. All four buildings were evaluated during the 1996 Cold War resources survey and determined ineligible for NRHP listing due to insufficient significance to qualify under Criterion Consideration G for exceptional significance. However, each of these buildings has reached 50 years of age since the 1996 study and would need to be reevaluated for NRHP eligibility under NRHP evaluation criteria A–D as part of the Air Force’s Section 106 compliance for these actions. Consultation with the SHPO regarding the demolition of these four buildings is in progress. **Appendix F** contains a letter from 319 CES/CEA initiating Section 106 consultation related to this project. SHPO and Section 106 consultation would be concluded prior to finalizing this IDEA.

There are no known NRHP-eligible archaeological sites in the APE for this project and no archaeological resources would be affected by the action. No previous archaeological surveys have been conducted in the immediate area around Hangars 520, 521, 522, and 523; however, due to previous ground disturbance the probability of buried cultural resources is low. If cultural materials or human remains are discovered inadvertently during construction, Grand Forks AFB would take appropriate actions to minimize impacts in compliance with Federal laws and regulations as outlined in the ICRMP for Grand Forks AFB.

This project would not involve disturbance of any previously undisturbed land and, therefore, would not have a direct impact on resources of traditional, religious, or cultural significance to Native American tribes. No known resources of traditional, religious, or cultural significance to Native American tribes are present at Grand Forks AFB. If resources of traditional, religious, or cultural significance to Native American tribes are identified in the vicinity of the project area, Grand Forks AFB would avoid, minimize, or mitigate any impacts from the Proposed Action on those resources.

Socioeconomics and Environmental Justice. Short-term, minor, beneficial effects on socioeconomic resources would be expected from the proposed demolition of Hangars 520, 521, 522, and 523. While it is assumed that local machinery would be sourced and local contractors would be used, some of the demolition could be completed by soldiers stationed at Grand Forks AFB. The demolition should not outstrip the local supply of workers as there are approximately 5,000 construction workers in the Grand Forks MSA (USCB 2000). Demolition activities would occur entirely on Grand Forks AFB and would have little potential to adversely affect off-installation residents as noise associated with demolition and the deposition of demolished materials would occur on-installation; therefore no environmental justice issues would be anticipated. No long-term effects on socioeconomic resources or environmental justice are expected to result from the demolition of Hangars 520, 521, 522, and 523.

Infrastructure. Negligible effects on infrastructure resources would be expected from the demolition of Hangars 520, 521, 522, and 523. Removal of these facilities would result in less demand for certain utilities, but this reduction would be negligible when compared with total installation usage.

Short-term, adverse, effects would be expected as a result of the generation of approximately 9,271 tons of demolition debris (USEPA 2009b). This is a short-term, adverse effect in that debris would only be generated during the demolition activities; however, debris that is not recycled would be landfilled, which would be considered a long-term, irreversible, adverse effect. Long-term, beneficial effects would be realized from the removal of outdated utilities. Long-term, beneficial effects on storm water systems would be expected from the decrease in impervious surfaces.

Hazardous Materials and Waste. No long-term effects on hazardous materials management or hazardous waste generation would be expected as a result of the proposed demolition of Hangars 520, 521, 522, and 523. However, the hangars could contain ACM, LBP, and PCBs, and sampling should occur prior to any demolition activities so that these materials can be properly characterized, handled, and

disposed of. Contractors would be responsible for the management of hazardous materials and petroleum product usage, as described in **Sections 4.4.1.1 and 4.4.1.2.**

Safety. Short-term, minor, adverse effects could occur from demolition of the hangars. Demolition activities pose an increased risk of construction-related accidents, but this level of risk would be managed by adherence to established OSHA, USEPA, and USAF safety regulations. The hangars could contain ACM and LBP, which would require appropriate characterization, handling, and disposal during demolition activities by qualified personnel. Long-term, beneficial effects on safety would also be experienced from the removal of ACM and LBP materials thus reducing exposure to personnel.

Demolition of the hangars would result in short-term, negligible, adverse effects on safety because demolition would occur near a QD arc. The arc is associated with aircraft parking safety zones. To avoid potential impacts on workers and the installation's mission, this project should be coordinated with Airfield Management.

4.4.2 Representative Construction Projects

4.4.2.1 C1. Construct Consolidated Security Forces

Currently, Security Forces functions are spread across Grand Forks AFB in five separate buildings, making effective control and coordination of functions inefficient. This project would consolidate the operations into a single facility to improve command and control, response times to emergency situations, and to support the entire installation in law enforcement and security operations. Construction activities would involve constructing pavements for parking and access roads, trenching and installing infrastructure for communications, security systems, lights, and underground utilities, and establishing landscaping and other site improvements. The new facility would comply with AT/FP guidelines as outlined in DOD construction standards and the USAF Installation Force Protection Guide. Known environmental constraints in relation to C1 are shown in **Figure 4-4**. In addition, the following provides a detailed environmental resource analysis of Project C1.

Noise. Short-term, minor, adverse effects on the noise environment would be expected as a result of the construction of this facility. The noise emanating from construction equipment would be localized, short-term, and intermittent during machinery operations. This area of Grand Forks AFB consists of open space and is used for industrial purposes; populations potentially affected by increased noise levels would include mainly USAF personnel in buildings approximately 100 feet or more from the proposed construction site. Expected noise levels would be comparable to a very noisy metropolitan area (approximately 92 dBA). No changes in operations are expected as a result of the construction of this building; therefore, no long-term effects on the ambient noise environment would be anticipated.

Land Use. No effects on land use would be expected from construction of the Consolidated Security Forces building. The construction of this facility would be within the Administrative land use, and outside of the installation's noise zones of concern, aircraft clear zones, and APZs. This project would slightly overlap with ERP site ST004 (former site of Building 306); however, remediation was conducted and a No Further Remedial Action Planned status was issued in 2004. Therefore, this site would be compatible with future use as the Consolidated Security Forces building. Present and future land uses would be compatible, and no changes in the administrative land use functions would be expected. Furthermore, construction of this facility is consistent with the General Plan, which is identified as the highest priority military construction project at Grand Forks AFB (Strom 2009a).

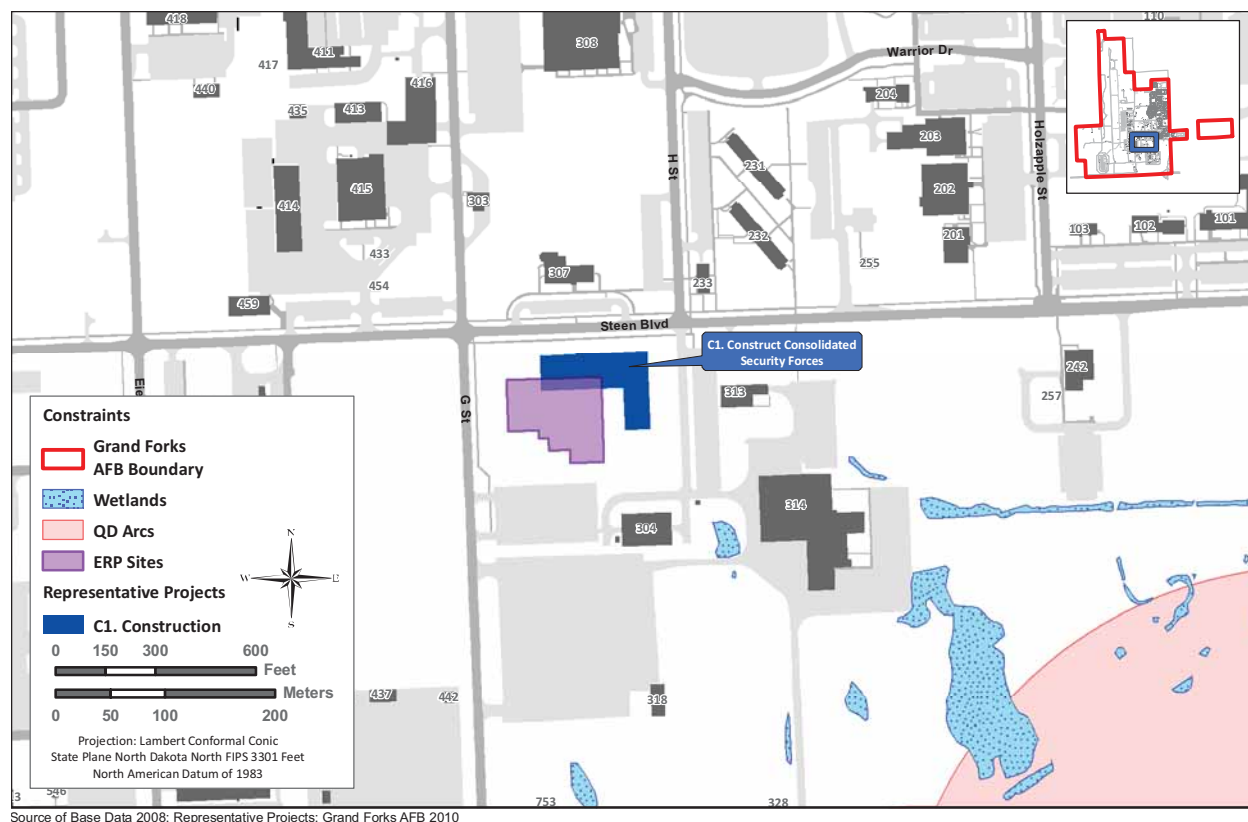


Figure 4-4. Environmental Constraints Associated with Project C1

Air Quality. Short-term, minor, adverse impacts would be expected from construction emissions and land disturbance. Construction of the Consolidated Security Forces facility would result in minor impacts on regional air quality during construction activities, primarily from site-disturbing activities, operation of construction equipment, and evaporative emissions from architectural coatings and asphalt paving operations. Appropriate fugitive dust-control measures would be employed during construction activities to suppress emissions. All emissions associated with construction operations would be temporary in nature. Long-term, minor, adverse impacts would be expected from operational emissions from natural gas boilers for heating the proposed facility. It is not expected that emissions from construction and operation of the proposed Consolidated Security Forces facility would contribute to or affect local or regional attainment status with the NAAQS. Emissions from Project C1 are summarized in **Table 4-8**. Emissions estimation spreadsheets and summary of the methodology used are included in **Appendix C**.

Geological Resources. Construction of the Consolidated Security Forces facility would result in short-term, moderate and long-term, minor adverse effects on geological resources. Short-term, moderate effects would be expected during construction activities when soils are disturbed due to construction of the Consolidated Security Forces facility and excavation for placement of utilities. These activities would include clearing of vegetation, paving, and grading. Clearing of vegetation would increase erosion and sedimentation potential. Soil erosion and sediment production would be minimized for all construction operations as a result of following an approved ESCP. Removal of vegetation would increase erosion and sedimentation. Please see **Section 4.4.2.1, Biological Resources**, for a discussion on vegetation. Implementation of erosion and sediment control and storm water management BMPs would minimize adverse effects.

Table 4-8. Estimated Air Emissions Resulting from Project C1

Activity	NO _x tpy	VOC tpy	CO tpy	SO ₂ tpy	PM ₁₀ tpy	PM _{2.5} tpy	CO ₂ tpy
Construction Combustion	2.708	0.355	1.181	0.196	0.192	0.186	309.130
Construction Fugitive Dust	--	--	--	--	4.562	0.267	--
Haul Truck On-Road	--	--	--	--	--	--	--
Construction Commuter	0.055	0.055	0.496	0.001	0.005	0.003	65.741
Total C1 Emissions	2.763	0.410	1.677	0.196	4.759	0.456	374.871
Percent of AQCR 172 Inventory	0.002	0.001	0.001	< 0.001	0.001	0.001	0.001*

Note: * Percent of State of North Dakota CO₂ emissions.

Long-term, minor adverse effects would result from disturbed and modified soil structure. Soil productivity, which is the capacity of the soil to produce vegetative biomass, would decline in disturbed areas and be eliminated in those areas within the footprint of building structures, roadways, or parking facilities. Loss of soil structure due to compaction from foot and vehicle traffic could result in changes in drainage patterns. Soil erosion- and sediment-control measures would be included in site plans to minimize long-term erosion and sediment production at each site. Use of storm water control measures that favor reinfiltration would minimize the potential for erosion and sediment production as a result of future storm events. Please see **Section 4.4.2.1**, water resources for an evaluation of impacts from the Proposed Action on water resources.

Although the Glyndon silt loam soil unit mapped at the site of the proposed Consolidated Security Forces facility is classified as prime farmland soil, the area where the soil occurs is not currently available for agricultural use and therefore would not be considered prime farmland.

The Consolidated Security Forces facility footprint would be adjacent to ERP site ST004, and it is possible that contaminated soils would be present. In addition to possible contaminated soils, shrink-swell soils are mapped at the site. Therefore, site-specific soil surveys should be conducted prior to implementation of the Consolidated Security Forces facility to determine if contaminated soils are present and the breadth and severity of any engineering limitations. Another engineering limitation could be the presence of a 4-foot-thick footing that remains buried under the ERP site. The length and depth of the footing is unknown. Although the proposed building could overlap with the footing, the project footprint is small and might not be affected by this remnant. Appropriate design considerations should reflect the potential overlap of the footing and project footprint. Construction BMPs would be implemented to minimize soil erosion; therefore, no significant adverse impacts on the soils would be anticipated. BMPs could include installing silt fencing and sediment traps, applying water to disturbed soil, and revegetating disturbed areas as soon as possible after disturbance, as appropriate.

Water Resources. Constructing the Consolidated Security Forces facility would result in short-term, and long-term, minor adverse effects on water resources. Short-term effects could occur from the removal of vegetation and excavation of soil for construction of the facility and installation of electrical power, communications, and data lines, resulting in increased sedimentation and storm water runoff velocity. This would be temporary until vegetation has been reestablished along utilities lines. If grading would be conducted, drainage patterns could be altered. Compaction of soils due to foot and vehicle traffic could

result in a decrease in soil permeability and water infiltration rates and potential subsequent alteration of drainage patterns.

Disturbance of soil and removal of vegetation associated with development could result in erosion of disturbed soils and transport of sediment and other pollutants into nearby water bodies during storm water flow events. Ensuring onsite storm water infiltration during construction activities would allow groundwater to recharge and minimize storm water runoff. Although the footprint of the facility is adjacent to the ERP site ST-04, groundwater investigations have not found any contamination and a No Further Remedial Action Planned for the site was issued. Therefore, groundwater contamination would not be anticipated to be an issue at the proposed site.

Long-term, minor, adverse impacts would occur from an increase in soil compaction and impervious surfaces, which would lead to increased erosion and sedimentation rates, and would contribute to increased storm water runoff volume and velocity. However, this runoff would be conveyed by the eastern drainage ditch to an outfall, and would not be expected to directly impact nearby water bodies. This project would disturb greater than 1 acre of land, and an NDPDES construction permit would be required.

Appropriate storm water management BMPs in accordance with the CWA Final Rule (described in **Section 3.5.1**) could contain runoff and minimize the potential for adverse impacts on adjacent and downstream water bodies. Storm water BMPs would be developed to promote recharge of runoff on the site resulting in a minimization of loss of recharge to groundwater in proximity to the site. The Consolidated Security Forces facility would not be constructed within or adjacent to floodplains or wetlands, and therefore construction and operation of the Consolidated Security Forces facility would not affect floodplains or wetlands, and would not be anticipated to adversely affect water supply. No significant effects would be expected.

Biological Resources. Effects on biological resources from constructing the Consolidated Security Forces facility would be expected to result in short- and long-term, negligible adverse effects.

Vegetation. The construction of a Consolidated Security Forces facility within this site would be expected to have direct, short- and long-term, negligible adverse effects on vegetation. The vegetation within and surrounding the proposed project is highly modified and landscaped. Therefore, short-term effects on adjoining vegetation would result from trampling and temporary removal, and long-term impacts would occur from permanent removal. These effects are anticipated to be negligible as this vegetation is not unique or rare within the installation or the region.

Wildlife. The construction of a Consolidated Security Forces facility within this site would be expected to have short- and long-term, negligible to minor, adverse effects on wildlife. Short-term, negligible, adverse effects on wildlife would be expected from the construction of the Consolidated Security Forces facility due to temporary disturbances from noise, construction activities, and heavy equipment use. High noise events could cause wildlife to engage in escape or avoidance behaviors, resulting in short-term, negligible, adverse effects. The areas of disturbance would be relatively small in size and would occur in a developed area where disturbances are common. Therefore, wildlife in the vicinity would be expected to be habituated to frequent disturbances. Most wildlife species in the construction vicinity would be expected to quickly recover once the construction noise and disturbances have ceased.

Long-term, negligible, adverse effects on wildlife would be expected from the permanent loss of wildlife habitat from the construction of the Consolidated Security Forces facility. The proposed site is assumed to provide only marginal habitat for wildlife as it is highly modified and landscaped within the cantonment area where disturbances are frequent; therefore, the loss of habitat from this construction project would be negligible.

Protected and Sensitive Species. Short-term, negligible, adverse effects on protected and sensitive species would be expected from the construction of a Consolidated Security Forces facility due to temporary disturbances from noise, construction activities, and heavy equipment use. High noise events could cause these species to engage in escape or avoidance behaviors, resulting in short-term, negligible, adverse effects. Short-term, minor adverse effects could be expected if construction activities prevented or disturbed nesting activities by state-listed or migratory birds. The areas of disturbance would be relatively small in size and occur in a developed area where disturbances are common. Therefore, any existing protected or sensitive species in the vicinity would be expected to be habituated to frequent disturbances. If any sensitive species occur in the construction vicinity, they would be expected to quickly recover once the construction noise and disturbances have ceased. Provided Grand Forks AFB follows the BMPs outlined in **Section 4.3.6, Protected and Sensitive Species** (e.g., perform groundbreaking activities outside of nesting season), and short-term, adverse impacts on protected and sensitive species would be negligible.

Long-term, negligible, adverse effects on protected and sensitive species would be expected from the permanent removal of habitat from the construction of the Security Forces facility. The proposed site is assumed to provide only marginal habitat for protected and sensitive species as it is highly modified and landscaped within a cantonment area where disturbances are frequent; therefore, the loss of habitat from this construction project would be negligible.

Wetland Habitat. No construction would occur within or adjacent to wetlands. Therefore, no effects on wetlands would be expected from the construction of a Consolidated Security Forces facility.

Cultural Resources. Construction of the Consolidated Security Forces building would be expected to result in short- and long-term, negligible, and adverse effects. The site for the new construction is adjacent to and across from a parking lot from Building 313, an NRHP-eligible building. The lot line of the new building is approximately 120 feet from the primary (west) façade of Building 313. Short-term effects during the construction period might include dust, noise, and vibration. However, none should persist after construction is completed. The new construction would likely affect the historic setting of Building 313. However, given the distance and lot set-back, and because massing of the new construction would be similar to other buildings currently surrounding Building 313, these effects would be negligible.

There are no known NRHP-eligible archaeological sites in the APE for this project and no archaeological resources would be affected by the action. No previous archaeological surveys have been conducted in the lot proposed for construction of the Consolidated Security Forces building; however, due to previous ground disturbance, the probability of buried cultural resources is low. If cultural materials or human remains are discovered inadvertently during construction, Grand Forks AFB would take appropriate actions to protect or minimize impacts in compliance with Federal laws and regulations as outlined in the ICRMP for Grand Forks AFB.

This project would not involve disturbance of any previously undisturbed land and, therefore, would not have a direct impact on resources of traditional, religious, or cultural significance to Native American tribes. No known resources of traditional, religious, or cultural significance to Native American tribes are present at Grand Forks AFB. If resources of traditional, religious, or cultural significance to Native American tribes are identified in the vicinity of the project area, Grand Forks AFB would avoid, minimize, or mitigate any impacts from the Proposed Action on those resources.

Socioeconomics and Environmental Justice. Short-term, minor, beneficial effects on socioeconomic resources would be expected from the construction of the proposed Consolidated Security Forces facility. While it is assumed that construction materials would be sourced locally and local contractors would be used, some of the construction might be completed by soldiers stationed at Grand Forks AFB. The

construction should not outstrip the local supply of workers as there are approximately 5,000 construction workers in the GFMSA (USCB 2000). Construction activities would occur entirely on Grand Forks AFB and would have little potential to adversely affect off-installation residents. No long-term effects on socioeconomic resources or environmental justice are expected to result from construction of the Consolidated Security Forces.

Infrastructure. Overall, negligible effects on infrastructure would be expected from the construction of the proposed Consolidated Security Forces. Short-term, adverse effects would be expected as a result of approximately 243 tons of debris generated during construction activities (USEPA 2009b). Construction debris is generally composed of clean materials, and most of this waste would be recycled or ground into gravel for reuse. However, debris that is not recycled would be landfilled, which would be considered a long-term, irreversible, adverse effect.

Utility demand would increase slightly due to the increased building footprint of the Consolidated Security Forces facility when compared to the demolition of Buildings 304 and 515, which currently house security forces functions. However, this change in utility demand would be negligible when compared with total installation usage.

Hazardous Materials and Waste. Short-term, minor, adverse effects would be expected from the use of hazardous materials during the construction process. Contractors would be responsible for the management of hazardous materials and petroleum product usage, which would be handled in accordance with Federal, state, and USAF regulations. Contractors must report the use of hazardous materials to the HAZMART, including pertinent information (e.g., MSDSs). If a material that is less hazardous can be used, the HAZMART should make these recommendations. Use of the HAZMART would also ensure that ODSs are not available for use. Use of ODSs in such products as refrigerants, aerosols, and fire suppression systems is not permitted by the DOD without a formal request by waiver.

This project overlaps ERP site ST004. The USTs at the site were found to be leaking in 1988. Soil and soil gas vapor extraction remedial actions were conducted in 1992 to 1993. Upon completion of the remediation, soil and groundwater were periodically sampled and analyzed until 2004 when it was determined that the remediation was complete and the site was designated clean and closed. No adverse environmental effects would be expected from constructing the Consolidated Security Forces facility at this site.

No long-term effects on hazardous materials and wastes would be anticipated from operation of the proposed Consolidated Security Forces facility, and the installation's waste streams would not be altered. Therefore, no modifications to Grand Forks AFB permits for hazardous materials or wastes would be expected. All hazardous materials and wastes created from the construction and operation of the proposed Consolidated Security Forces facility would be in compliance with the installation's Hazardous Waste Management Plan (GFAFB 2008c) and all applicable Federal, state, and local regulations and policies.

Safety. Short-term, negligible to minor, adverse effects could occur. Construction activities pose an increased risk of construction-related accidents, but this level of risk would be managed by adherence to established Federal, state, and local safety regulations. Workers would be required to wear protective gear such as ear protection, steel-toed boots, hard hats, gloves, and other appropriate safety gear. Construction areas would be fenced and appropriately marked with signs. Construction equipment and associated trucks transporting material to and from construction sites would be directed to roads and streets that have a smaller volume of traffic. Therefore, no long-term, adverse impacts on safety would be expected.

The proposed Consolidated Security Forces facility would be located near ERP site ST004 and, therefore, could affect the monitoring of that site. There is a potential for workers to encounter contamination during construction activities within ERP sites. If contamination is encountered, it would be handled, stored, transported, and disposed of in accordance with the installation's *Hazardous Waste Management Plan* and SPCC Plan; and all applicable Federal, state, and local regulations and policies. See **Section 4.4.1.1, Hazardous Materials and Wastes**, for more information regarding contamination at this ERP site.

4.4.2.2 C2. Construct BCE Pavements and Maintenance Facility/Snow Barn

This project involves demolishing and replacing the snow barn currently located at Building 522. Building 522 is scheduled for demolition so a new hangar can be constructed in that area to support the new RPA mission. Known environmental constraints in relation to C2 are shown in **Figure 4-5**. In addition, the following provides a detailed environmental resource analysis of Project C2.

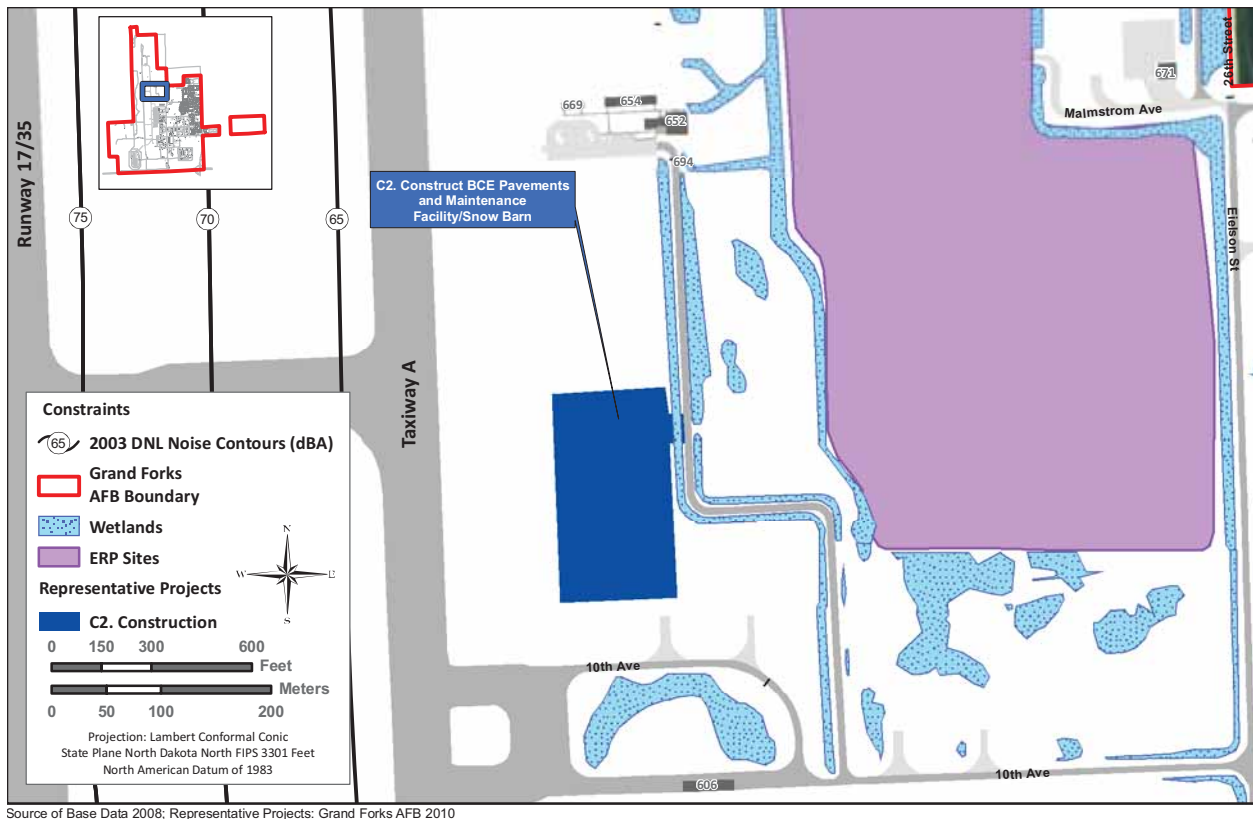


Figure 4-5. Environmental Constraints Associated with Project C2

An alternative location to the proposed site would be to use the existing snow barn location. However, the future Predator RPA campus is currently planned at that location. Additional space close to the flightline is currently occupied, and therefore, not available for new construction. Space is available near Building 517 on the southern end of the flightline, but because access to the primary runway is beyond the southern end of the runway, response time for clearing snow on the runway would be delayed. The proposed location would be more centrally located on the runway than the space near Building 517; and therefore, this site is the preferred location. The proposed location meets required mission response times and is located in an area not planned for future mission facilities. Therefore, no practical alternative location could be found for this facility and a FONPA is required.

Noise. Short-term, minor, adverse effects on the noise environment would be expected as a result of the construction of this facility. The noise emanating from construction equipment would be localized, short-term, and intermittent during machinery operations. Heavy construction equipment would be operated periodically during construction; therefore noise levels from the equipment would fluctuate throughout the day. This area of Grand Forks AFB consists of open space and is used for airfield operation purposes. Populations potentially affected by increased noise levels would primarily include USAF personnel in buildings approximately 1,000 feet or more from the proposed construction site. Expected noise levels would be comparable to a very noisy urban residential area (approximately 66 dBA). No changes in operations would be expected as a result of the construction of this building; therefore, no long-term effects on the ambient noise environment would be anticipated.

Land Use. No short- or long-term, adverse effects on land use would be expected from construction of BCE Pavements and Maintenance Facility/Snow Barn. The construction of this facility would be within the Airfield land use, and this is not anticipated to change in the future. The function of this project is to provide a facility to house maintenance and snow-removal equipment that are needed for operation of the airfield. Depending on the type of maintenance tasks, this facility would likely be Aircraft O&M or Industrial. Aircraft O&M and Industrial uses are both compatible with Airfield; it is essential that Aircraft O&M is close to the airfield and Industrial uses are normally close (USAF 1998). Therefore, the present and future uses of the facility would be compatible with the surrounding Airfield use.

The facility would be outside of the installation's noise zones of concern, aircraft clear zones, and APZs. The facility would be within a QD-arc associated with a hot cargo pad, an area used for loading and unloading weapons, ammunition, explosives, and other hazardous cargo from aircraft. However, the hot cargo pad is planned to be relocated under the new RPA mission. Therefore, Grand Forks AFB has submitted a waiver package to HQ AMC requesting reconfiguration of the QD arc from this area to the site where the hot cargo pad would be relocated.

Air Quality. Short-term, minor, adverse impacts would be expected from construction emissions and land disturbance. The Proposed Action would result in minor impacts on regional air quality during construction activities, primarily from site-disturbing activities, operation of construction equipment, and evaporative emissions from architectural coatings and asphalt paving operations. Appropriate fugitive dust-control measures would be employed during construction activities to suppress emissions. All emissions associated with construction operations would be temporary in nature. Long-term, minor, adverse impacts would be expected from operational emissions from natural gas boilers for heating the proposed facility. It is not expected that emissions from construction and operation of the proposed BCE Pavements and Maintenance Facility/Snow Barn would contribute to or affect local or regional attainment status with the NAAQS. Emissions from the Proposed Action are summarized in **Table 4-9**. Emissions estimation spreadsheets and summary of the methodology used are included in **Appendix C**.

Geological Resources. Implementation of the BCE Pavements and Maintenance Facility/Snow Barn would be expected to result in short-term, moderate and long-term, minor, adverse effects on geology and soils. Effects would be expected to be similar to effects from construction of the Consolidated Security Forces facility. During construction activities, soils would be disturbed, graded, filled, and trenched, and vegetation removed. Long-term effects would be anticipated from the increased impervious surface and soil erosion and sedimentation. Storm water runoff would also increase in quantity and velocity due to the increase in impervious surfaces. Although the Glyndon silt loam soil unit mapped at the site of the proposed Snow Barn is classified as a prime farmland soil, the area where the soil occurs is not currently available for agricultural use and therefore would not be considered prime farmland.

Table 4-9. Estimated Air Emissions Resulting from Project C2

Activity	NO _x tpy	VOC tpy	CO tpy	SO ₂ tpy	PM ₁₀ tpy	PM _{2.5} tpy	CO ₂ tpy
Construction Combustion	2.689	0.381	1.175	0.195	0.191	0.185	307.001
Construction Fugitive Dust	--	--	--	--	2.476	0.165	--
Haul Truck On-Road	--	--	--	--	--	--	--
Construction Commuter	0.055	0.055	0.496	0.001	0.005	0.003	65.741
Total C2 Emissions	2.744	0.436	1.671	0.196	2.671	0.353	372.741
Percent of AQCR 172 Inventory	0.002	0.001	0.001	< 0.001	0.002	0.001	0.001*

Note: * Percent of State of North Dakota CO₂ emissions.

Shrink-swell soils are mapped at the proposed site; therefore, site-specific soil surveys should be conducted prior to construction of the Snow Barn to determine the breadth and severity of any engineering limitations and requirements, and to determine appropriate BMPs or mitigation techniques.

Water Resources. Construction of the Snow Barn would be expected to result in effects on water resources similar to the effects described for the Consolidated Security Forces facility. Short- and long-term, minor, adverse effects would be anticipated from the construction and operation of the Snow Barn. Adverse effects would occur from the removal of vegetation and excavation of soil for construction of the facility and installation of utilities, resulting in increased sedimentation and storm water runoff velocity.

Wetland hydrology could be directly altered by implementing construction activities related to Project C2. Impacts on adjacent wetlands and other water resources would be avoided through design, siting, and proper implementation of appropriate environmental protection measures and BMPs as presented in **Appendix G**. Proper implementation of appropriate environmental protection measures and BMPs identified in **Appendix G** would ensure that no effects on surrounding wetlands or other waters of the United States would occur. In addition, implementation of construction BMPs in accordance with the CWA Final Rule (see **Section 3.5.1**) would be developed to promote recharge of runoff on the site resulting in a minimization of loss of recharge to groundwater in proximity to the site. Correspondence with regulatory and resource agencies and any necessary permitting would be obtained prior to commencing ground-breaking construction activities.

In the event of a spill or leak of fuel or other contaminants, there could be adverse effects on the receiving water bodies. All fuels and other potentially hazardous materials would be contained and stored appropriately. In the event of a spill, procedures identified in the installation's SPCC Plan would be followed to quickly contain and clean up a spill. BMPs identified in the SPCC Plan would minimize the potential for and extent of associated contamination.

Long-term, minor, adverse effects on water resources would be anticipated. A decrease in soil permeability and water infiltration associated with compaction can reduce the rate and volume of groundwater recharge in the affected area. Decreased soil permeability would alter natural storm water flow regimes. While the reduction in soil permeability and water infiltration rates as a result of soil compaction is an irretrievable adverse effect, the reduction of recharge area and rate of recharge for the groundwater basins would be negligible when compared with the total recharge area that is available. Additionally, increased storm water runoff volume and velocity could affect wetland hydrology, as more

water would be introduced into wetlands. This could promote groundwater recharge if wetland outflow occurs primarily through groundwater flow. Impacts on wetland water quality and biota are analyzed in **Section 4.4.2.2, Biological Resources**.

Biological Resources. Effects from constructing the BCE Pavements and Maintenance Facility/Snow Barn would be expected to be short-term, negligible and long-term, negligible to minor, and adverse.

Vegetation. Short-term impacts on vegetation from the construction of BCE pavements and a maintenance facility would be similar to those described in **Section 4.4.2.1, Vegetation**. Long-term impacts on vegetation would be similar to, but greater than, those described in **Section 4.4.2.1, Vegetation**. The existing vegetation within the proposed construction site is regularly mowed mixed grass prairie, which has a higher value from a native and habitat perspective than the landscaping in the proposed Consolidated Security Forces site; therefore, long-term, adverse impacts on vegetation would be slightly greater.

Wildlife. Short-term, negligible, adverse effects on wildlife would be similar to those described in **Section 4.4.2.1, Wildlife**. The existing habitat within the proposed BCE Pavements and Maintenance Facility/Snow Barn project area is mixed-prairie grassland maintained between 7 and 14 inches in height. The wildlife species utilizing this area are anticipated to be habituated to high noise events due to the proximity of the site to the runway. Additionally, wildlife would also likely be habituated to other frequent disturbances, such as harassment due to bird/wildlife aircraft strike hazard (BASH) concerns and regular mowing. Therefore, short-term, adverse impacts on wildlife are anticipated to be negligible. Long-term, negligible to minor, adverse effects on wildlife, particularly grassland bird species, would be expected from the permanent removal of mixed-grass prairie habitat in the proposed project area. The loss of this habitat would be expected to have only negligible to minor, adverse impacts on wildlife as it is mowed regularly and designed to provide a low-value habitat to wildlife posing BASH risks.

Protected and Sensitive Species. Indirect, short-term, adverse effects on protected and sensitive species would be similar to those described in **Section 4.4.2.1, Protected and Sensitive Species**. Species utilizing this area are anticipated to be habituated to high noise events due to the proximity of the site to the runway, and other frequent disturbances, such as harassment due to BASH concerns and regular mowing. Therefore, indirect, short-term, adverse impacts on sensitive and protected species would be negligible. Short-term, major, adverse effects on migratory birds could be expected if construction occurs during the nesting season, as migratory bird nests could be destroyed as a result of land clearing, resulting in a take of migratory birds. However, provided Grand Forks AFB follows the BMPs outlined in **Section 4.3.6, Protected and Sensitive Species** (e.g., perform ground-breaking activities outside of nesting season or prevent birds from nesting if construction performed during nesting season), significant adverse effects on migratory birds would not be expected.

Long-term, negligible to minor, adverse effects on protected and sensitive species, particularly grassland bird species, would be expected from the permanent removal of mixed-grass prairie habitat in the proposed project area. The loss of this habitat would not have significant impacts on these species as it is mowed regularly and designed to provide a low-value habitat to wildlife posing BASH risks.

Wetland Habitat. The proposed BCE Pavements and Maintenance Facility/Snow Barn project would result in direct effects on wetlands or other jurisdictional waters of the United States. An access road would be constructed through the jurisdictional wetland associated with a drainage ditch, and culverts would be installed to convey wetland flow in the drainage ditch. Therefore, minor, direct, adverse effects on this wetland would occur from development in the wetland. Effects on wetlands would be avoided to the maximum extent practicable through design and implementation of environmental protection

measures and BMPs as outlined in **Appendix G**. In addition, project design would be coordinated with 319 CES/CEA.

In accordance with EO 11990, *Protection of Wetlands*, and AFI 32-7064, a FONPA has been prepared and would be approved for all projects occurring within wetland areas. In addition, Grand Forks AFB would be required to obtain a permit under Section 404 of the CWA for actions determined to adversely impact jurisdictional wetlands on the installation through dredging or placement of fill within wetlands, and would likely be required to mitigate or compensate for the impacts made on these wetlands in order to comply with the “No Net Loss” national policy. If it is determined that discharge into wetlands or waters of the United States from facility construction or operations would occur, Grand Forks AFB would be required to undergo Section 401 water quality certification and obtain an NPDES permit prior to conducting construction activities. Potential increased erosion, sedimentation, and transport of pollutants in runoff or by wind could occur during construction activities. Storm water design requirements would be implemented in compliance with EISA Section 438. However, adherence to an ESCP and SWPPP should prevent surface water degradation. Once the culvert is in place, long-term, minor effects on the wetland would be expected. The local increase in impervious surface associated with the culvert would result in a slight alteration of wetland hydrology, including a minor increase in flow velocity. Proper implementation of appropriate BMPs, as discussed in **Appendix G**, would be implemented to minimize the potential for adverse effects on wetlands and other waters of the United States. In the event of a spill, procedures outlined in the Grand Forks AFB’s SPCC Plan would be followed to contain and clean up a spill quickly (see **Sections 3.10** and **4.3.10** for a discussion on hazardous materials and wastes). Any necessary agency coordination and required permits would be completed prior to commencing any ground-breaking activities. Therefore, effects on wetlands and other waters of the United States would not be significant based on proper implementation of environmental protection measures and construction BMPs as outlined in **Appendix G**.

Cultural Resources. No historic properties would be affected by the construction of the BCE Pavements and Maintenance Facility/Snow Barn. The site for the new construction is not near any previously identified historic buildings.

There are no known NRHP-eligible archaeological sites in the APE for this project and no archaeological resources would be affected by the action. The site of the new construction lies within an area previously surveyed in 1996 (USAF 2008b). If cultural materials or human remains are discovered inadvertently during construction, Grand Forks AFB would take appropriate actions to protect or minimize impacts in compliance with Federal laws and regulations as outlined in the ICRMP for Grand Forks AFB.

No known resources of traditional, religious, or cultural significance to Native American tribes are present at Grand Forks AFB. If resources of traditional, religious, or cultural significance to Native American tribes are identified in the vicinity of the project area, Grand Forks would avoid, minimize, or mitigate any impacts from the Proposed Action on those resources.

Socioeconomics and Environmental Justice. Short-term, minor, beneficial effects on socioeconomic resources would be expected from the construction of the proposed BCE Pavements and Maintenance Facility/Snow Barn. While it is assumed that construction materials would be sourced locally and local contractors would be used, some of the construction might be completed by soldiers stationed at Grand Forks AFB. The construction should not outstrip the local supply of workers as there are approximately 5,000 construction workers in the GFMSA (USCB 2000). Construction activities would occur entirely on Grand Forks AFB and would have little potential to adversely affect off-installation residents. No long-term effects on socioeconomic resources or environmental justice would be expected to result from construction of the BCE Pavements and Maintenance Facility/Snow Barn.

Infrastructure. Overall, negligible effects on infrastructure resources would be expected from the construction of the proposed BCE Pavements and Maintenance Facility/Snow Barn.

Short-term, adverse effects would be expected as a result of the generation of approximately 285 tons of construction debris (USEPA 2009b). This is a short-term, adverse effect as debris would only be generated during construction activities. Construction debris is generally composed of clean materials, and most of this waste would be recycled or ground into gravel for reuse. However, debris that is not recycled would be landfilled, which would be considered a long-term, irreversible, adverse effect.

The increased demand for utility services, such as water supply, electricity, natural gas, and sanitary sewer, would be offset by the decreased demand resulting from the demolition of Building 522. This change in utility demand would be negligible when compared with total installation usage.

Hazardous Materials and Waste. Short-term, minor, adverse effects would be expected from the use of hazardous materials during the construction process. Contractors would be responsible for the management of hazardous materials and petroleum product usage, which would be handled in accordance with Federal, state, and USAF regulations. Contractors must report the use of hazardous materials to the HAZMART, including pertinent information (e.g., MSDS).

Long-term, minor, adverse effects on hazardous materials and wastes management are anticipated from operation of the proposed BCE Pavements and Maintenance Facility/Snow Barn. The proposed BCE Pavements and Maintenance Facility/Snow Barn would require the acquisition and storage of large quantities of asphalt. Asphalt is a by-product of the petroleum refining process. Additionally, this facility would require diesel fuel oil or heavy furnace oil in the production process. The proposed maintenance facility would not generate new waste streams; therefore, no modifications to Grand Forks AFB permits or hazardous materials or wastes would be expected. All hazardous materials and wastes used or generated from the construction and operation of the proposed BCE Pavements and Maintenance Facility/Snow Barn would be in compliance with the installation's Hazardous Waste Management Plan (GFAFB 2008c) and all applicable Federal, state, and local regulations and policies.

Safety. Short-term, minor, adverse effects could occur. Construction activities pose an increased risk of construction-related accidents, but this level of risk would be managed by adherence to established Federal, state, and local safety regulations. Workers would be required to wear protective gear such as ear protection, steel-toed boots, hard hats, gloves, and other appropriate safety gear. Construction areas would be fenced and appropriately marked with signs to prevent trespassing. Construction equipment and associated trucks transporting material to and from the construction sites would be directed to roads and streets that carry minimum vehicles. Therefore, no long-term, adverse impacts on safety would be expected.

Construction activities associated with the proposed BCE Pavements and Maintenance Facility/Snow Barn would occur within a QD arc associated with the hot refueling pad. To avoid potential impacts on workers and the installation mission, this project should be coordinated with Airfield Management.

4.4.2.3 C3. Construct Indoor Small Arms Range

Building 654 currently houses the Indoor Small Arms Range and does not comply with USAF safety standards, including proper ventilation controls for contaminants. Demolition of the existing small arms range would include lead abatement. The new facility would provide a 28-point, 100-meter range with more advanced training opportunities including lateral movement drills, pop-up targets, and other tactical firing exercises. The new facility would contain a machine gun range, so personnel would not be required to leave the installation to train on machine guns. Berms to the north and east of the current facility

would be demolished. Known environmental constraints in relation to C3 are shown in **Figure 4-6**. In addition, the following provides a detailed environmental resource analysis of Project C3.

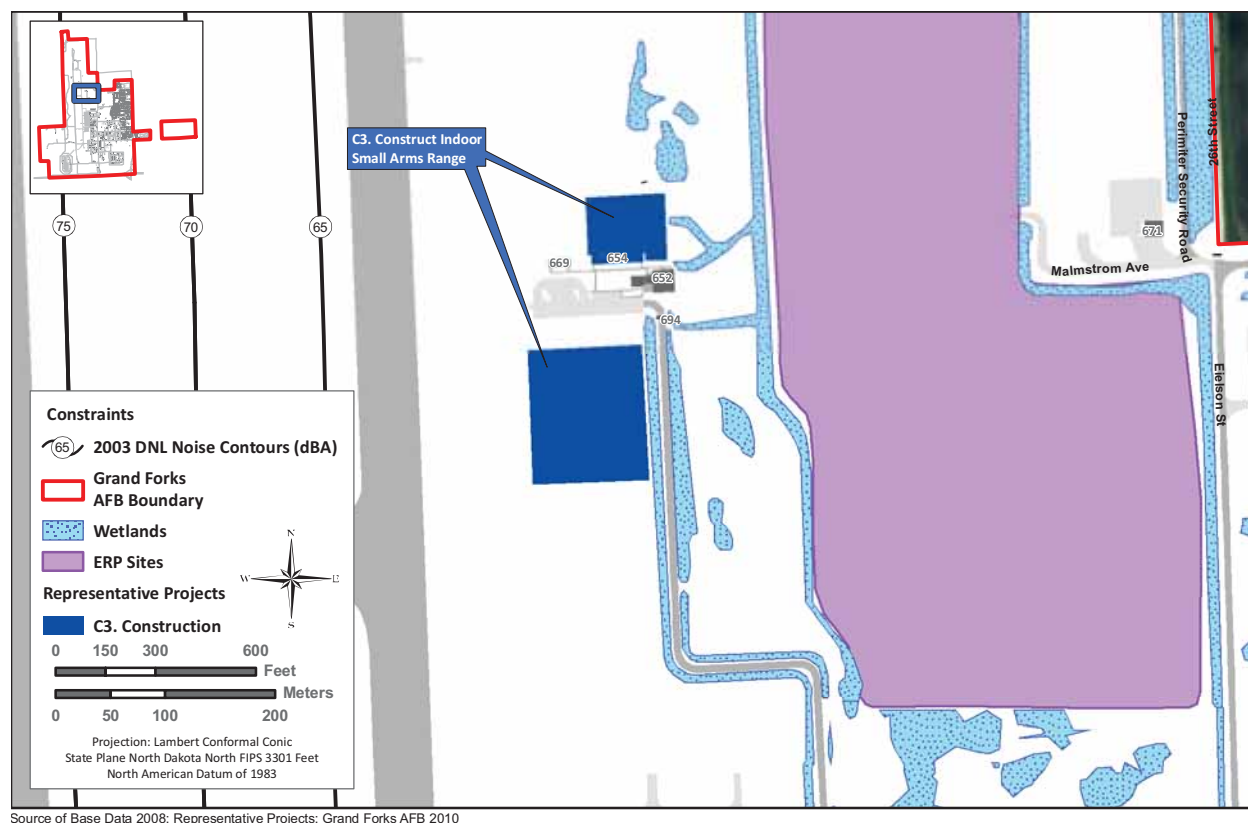


Figure 4-6. Environmental Constraints Associated with Project C3

An alternative to the proposed site location for construction of the Indoor Small Arms Range would be to build within the existing small arms range site. However, this alternative location would be in the proposed QD arc of the proposed hot cargo pad to the north. By siting the Indoor Small Arms Range at the proposed location, the range would be close to the Combat Arms Training and Maintenance (CATM) classroom and the armory at Building 652, which would reduce transportation time for students and employees using the range. To the east and north of the CATM classroom are wetlands and landfill caps, and the west of CATM classroom would site the range too close to the taxiway. Therefore, the proposed location is the preferred location. Therefore, no practical alternative location could be found for this facility and a FONPA is required.

Noise. Short-term, minor, adverse effects on the noise environment would be expected as a result of the construction of this facility. The noise emanating from construction equipment would be localized, short-term, and intermittent during machinery operations. Heavy construction equipment would be operated periodically during construction; therefore, noise levels from the equipment would fluctuate throughout the day. This area of Grand Forks AFB is used for industrial and airfield operation purposes. Populations potentially affected by increased noise levels would primarily include USAF personnel in buildings approximately 100 feet or more from the proposed construction site. Expected noise levels would be comparable to a very noisy metropolitan center (approximately 92 dBA). The noise effects could be mitigated by scheduling training times at the existing small arms range around the proposed construction schedule.

Long-term, beneficial effects would be expected from constructing the Indoor Small Arms Range. The design of the proposed facility would meet the requirements addressed in Engineering Technical Letter (ETL) 08-11, *Small Arms Range Design and Construction* (USAF 2008c). The noise-reduction measures provided in ETL 08-11 (e.g., steel plate wall designs, unpainted heavy masonry walls, and absorptive acoustical surfacing) would result in minimal noise impacts outside the proposed facility during operations.

Aside from small arms firing, noise would occur within the facility, such as noise from the ventilation system. Per ETL 08-11, noise levels inside the facility at the firing line when no one is firing should be considerably less than 85 dBA to improve communication between shooters and range officials. Short duration noise from small arms firing would exceed 85 dBA and could be as high as 160 dBA. The range design should prevent the reflection of higher noise levels by using sound-absorbing materials where possible. Personnel inside of the Indoor Small Arms Range would likely wear hearing protection, which would provide protection against high levels of short-term noise (USAF 2008c).

As discussed in **Section 3.1**, noise contours from the existing range are present around the range and at facilities east of the range. Since the existing Small Arms Range is not fully enclosed and the Proposed Indoor Small Arms Range would be enclosed, the Proposed Action would result in a beneficial impact on the ambient noise environment. The Proposed Action would not result in additional noise impacts from military traffic on the roadways surrounding the installation as only Grand Forks AFB personnel would use the proposed facility.

Land Use. Long-term, minor, adverse effects on land use would be expected from the construction of the Indoor Small Arms Range. The facility would be constructed within the existing Airfield land use category, just south of the existing outdoor machine gun and small arms range facilities. Training facilities such as the small arms range are categorized as Industrial land use (USAF 1998); therefore, this project would require a land use change to the Industrial land use category. However, Industrial and Airfield land uses are compatible, and the project would not introduce new uses to the area as the existing ranges would be approximately 150 feet north. The location and use of this facility would be compatible with existing and future land use at its proposed location and in surrounding areas.

Air Quality. Short-term, minor, adverse impacts would be expected from construction and demolition emissions and land disturbance. Construction of the proposed Indoor Small Arms Range would result in minor impacts on regional air quality during construction and demolition activities, primarily from site-disturbing activities, operation of construction equipment, evaporative emissions from architectural coatings, and haul truck operations. Appropriate fugitive dust-control measures would be employed during construction and demolition activities to suppress emissions. All emissions associated with construction and demolition operations would be temporary in nature. Long-term, minor, adverse impacts would be expected from operational emissions from natural gas boilers for heating the proposed facility. Lead emissions from firing small arms and machine gun munitions are anticipated to remain at current levels. It is not expected that emissions from demolition of existing facility and infrastructure and construction and operation of the proposed Indoor Small Arms Range facility would contribute to or affect local or regional attainment status with the NAAQS. Emissions from the Indoor Small Arms Range are summarized in **Table 4-10**. Emissions estimation spreadsheets and summary of the methodology used are included in **Appendix C**.

Table 4-10. Estimated Air Emissions Resulting from Project C3

Activity	NO _x tpy	VOC tpy	CO tpy	SO ₂ tpy	PM ₁₀ tpy	PM _{2.5} tpy	CO ₂ tpy
Construction Combustion	3.932	0.518	1.718	0.290	0.279	0.271	446.326
Construction Fugitive Dust	--	--	--	--	2.552	0.128	--
Haul Truck On-Road	0.144	0.104	0.423	0.011	0.171	0.044	36.430
Construction Commuter	0.083	0.082	0.744	0.001	0.008	0.005	98.611
Total C3 Emissions	4.159	0.704	2.885	0.302	3.009	0.448	581.368
Percent of AQCR 172 Inventory	0.002	0.002	0.001	< 0.001	0.001	0.001	0.001*

Note: * Percent of State of North Dakota CO₂ emissions.

Geological Resources. Effects on geology and soils from construction of the Indoor Small Arms Range would be expected to be similar to effects described for construction of the Consolidated Security Forces facility or the Snow Barn. Short-term, minor, adverse effects would be anticipated from the disturbance of soil through grading, filling, and trenching activities. Vegetation would be removed within the footprint of the Indoor Small Arms Range and surrounding areas during construction. Soil erosion and sedimentation rates would increase during construction activities, and storm water runoff would increase in quantity and velocity.

Long-term, minor, adverse effects on soils would occur from implementation of the Indoor Small Arms Range. Impervious surfaces would increase, resulting in potential increased soil erosion, sedimentation, and storm water runoff quantity and velocity. Implementation of BMPs would minimize the effect of the Indoor Small Arms Range on soils. Shrink-swell soils are mapped at the proposed site; therefore, site-specific soil surveys should be conducted prior to construction of the Indoor Small Arms Range to determine the breadth and severity of any engineering limitations and requirements.

Water Resources. Effects from constructing the Indoor Small Arms Range would be comparable to the effects from constructing the Snow Barn. Construction and operation of the Indoor Small Arms Range and demolition of the current range would be expected to result in short- and long-term, minor, adverse effects. Short-term, minor, adverse effects would occur from compaction, grading, and removal of vegetation, resulting in increased soil erosion, sedimentation, and storm water runoff volume and velocity. Wetland hydrology could be directly altered by implementing construction activities related to Project C2. Effects would not be significant based on proper implementation of environmental protection measures and construction BMPs and techniques outlined in **Appendix G**. In addition, an approved ESCP would be followed, and BMPs in accordance with the CWA Final Rule (see **Section 3.5.1**) would be implemented to retain runoff and promote recharge of groundwater.

Long-term, minor, adverse effects on water resources would be anticipated. Several berms surrounding the existing small arms range would be demolished, which would likely alter drainage patterns. However, several storm drainage sewers are in place and would continue to convey drainage into the nearby ditches. Therefore, demolition of the existing berms would not be expected to result in long-term effects on water resources or wetland hydrology. The design of the Indoor Small Arms Range would be coordinated with 319 CES/CEA to ensure that direct and indirect impacts on surrounding wetlands and waters of the United States would be minimized to the maximum extent possible. This project would disturb greater than 1 acre of land, and an NDPDES construction permit would be required.

Biological Resources. Effects on biological resources from the construction and operation of the proposed Indoor Small Arms Range would be expected to be short-term, minor, and long-term, negligible to minor and adverse.

Vegetation. Short-term impacts on vegetation from the construction of an Indoor Small Arms Range would be similar to those described in **Section 4.4.2.1, Vegetation**. Long-term, negligible to minor, adverse effects on vegetation would be expected from this construction project. As currently sited, the Indoor Small Arms Range would be constructed within a predominantly regularly mowed, landscaped area with a small portion of wetland in its northeastern corner (GFAFB 2008f). Therefore, a minor amount of wetland vegetation could be permanently removed from this construction project.

Wildlife. Short- and long-term, adverse effects on wildlife from the construction of an Indoor Small Arms Range would be similar to those described in **Section 4.4.1.1, Wildlife**.

Protected and Sensitive Species. Short- and long-term, adverse effects on protected and sensitive species from the construction of an Indoor Small Arms Range would be similar to those described in **Section 4.4.1.1, Protected and Sensitive Species**. Provided Grand Forks AFB follows the BMPs outlined in **Section 4.3.6, Protected and Sensitive Species** (e.g., perform ground-breaking activities outside of nesting season or prevent birds from nesting if construction performed during nesting season), short-term, adverse impacts on protected and sensitive species would be negligible.

Wetland Habitat. The demolition of the existing small arms range and associated soil berms and construction of the proposed Indoor Small Arms Range would result in minor, direct, adverse impacts on wetlands and other jurisdictional waters of the United States. Access roads and culverts for the proposed Indoor Small Arms Range would impact existing wetlands and jurisdictional waters of the United States associated with drainage ditches adjacent to the existing small arms facility and soil berms proposed for demolition to the east. Additional wetlands within drainage ditches of undetermined jurisdictional status occur approximately 150 feet east of the proposed construction site for the Indoor Small Arms Range. Adherence to an ESCP and SWPPP should prevent surface water degradation. Assuming appropriate environmental protection measures and BMPs as outlined in **Appendix G** are implemented during construction and demolition activities associated with Project C3, adverse effects on wetlands and surrounding waters of the United States would be minimized. In accordance with EO 11990, *Protection of Wetlands*, and AFI 32-7064, a FONPA has been prepared and would be approved for all projects occurring within wetland areas. In addition, Grand Forks AFB would be required to obtain a permit under Section 404 of the CWA for actions determined to adversely impact jurisdictional wetlands on the installation through dredging or placement of fill within wetlands, and would likely be required to mitigate or compensate for the impacts made on these wetlands in order to comply with the “No Net Loss” national policy. If it is determined that discharge into wetlands or waters of the United States from facility construction or operations would occur, Grand Forks AFB would be required to undergo Section 401 water quality certification and obtain an NPDES permit prior to conducting construction activities. Potential increased erosion, sedimentation, and transport of pollutants in runoff or by wind could occur during construction activities. Storm water design requirements would be implemented in compliance with EISA Section 438. In the event of a spill, procedures outlined in Grand Forks AFB’s SPCC Plan would be followed to contain and clean up a spill quickly (see **Sections 3.10** and **4.3.10** for discussions on hazardous materials and wastes). Any necessary agency coordination and required permits would be completed prior to commencing any ground-breaking activities. Impacts on adjacent wetlands and other waters of the United States would be avoided through design, siting, and proper implementation of appropriate environmental protection measures and BMPs as presented in **Appendix G** that ensure no effects on surrounding wetlands or other waters of the United States would occur.

Cultural Resources. Short-term, minor, adverse, and long-term negligible effects would be expected from constructing and operating the Indoor Small Arms Range. The project site is approximately 700 feet north of Building 606, a NRHP-eligible building. Access to the construction site would be along a road approximately 300 feet east of Building 606. Short-term effects during the period of construction could include dust and noise; however, these effects would be temporary and would not persist after construction is completed. The new construction might affect the historic setting of Building 606, but given the distance and the similarity in spacing between existing adjacent buildings, these effects would be negligible.

There are no known NRHP-eligible archaeological sites in the APE for this project and no archaeological resources would be affected by the action. The site of the new construction lies within an area previously surveyed in 1996 (USAF 2008b). If cultural materials or human remains are discovered inadvertently during construction, Grand Forks AFB would take appropriate actions to protect or minimize impacts in compliance with Federal laws and regulations as outlined in the ICRMP for Grand Forks AFB.

No known resources of traditional, religious, or cultural significance to Native American tribes are present at Grand Forks AFB. If resources of traditional, religious, or cultural significance to Native American tribes are identified in the vicinity of the project area, Grand Forks AFB would avoid, minimize, or mitigate any impacts from the Proposed Action on those resources.

Socioeconomics and Environmental Justice. Short-term, minor, beneficial effects on socioeconomic resources would be expected from the construction of the proposed Indoor Small Arms Range. While it is assumed that construction materials would be sourced locally and local contractors would be used, some of the construction might be completed by soldiers stationed at Grand Forks AFB. The construction should not outstrip the local supply of workers as there are approximately 5,000 construction workers in the GFMSA (USCB 2000). Construction activities would occur entirely on Grand Forks AFB and would have little potential to adversely affect off-installation residents. No long-term effects on socioeconomic resources or environmental justice would be expected from construction or operation of the Indoor Small Arms Range.

Infrastructure. Overall, negligible effects on infrastructure would be expected from the construction of the Indoor Small Arms Range. Short-term, minor, adverse effects would be expected as a result of the generation of approximately 115 tons of construction debris (USEPA 2009b). This is a short-term, adverse effect in that debris would only be generated during construction activities. Construction debris is generally composed of clean materials, and most of this waste would be recycled or ground into gravel for reuse. However, debris that is not recycled would be taken to the landfill, which would be considered a long-term, irreversible, adverse effect.

The increased demand for utility services, such as water supply, electricity, natural gas, and sanitary sewer, would be offset by the decreased demand resulting from the demolition of Building 654. This change in utility demand would be negligible when compared with total installation usage.

Hazardous Materials and Waste. Short-term, minor, adverse effects would be expected from the use of hazardous materials during the construction process. Contractors would be responsible for the management of hazardous materials and petroleum product usage, which would be handled in accordance with Federal, state, and USAF regulations. Contractors must report the use of hazardous materials to the HAZMART, including pertinent information (e.g., MSDS). If a material that is less hazardous can be used, the HAZMART should make these recommendations.

An additional component of the project is to demolish the existing Small Arms Range, upgrade the Machine Gun Range, and remove the backstop soil berms. The existing facility to be demolished and

renovated could contain a significant quantity of lead dust. The materials generated from the demolition and renovation would need to be sampled for lead contamination and disposed of accordingly. The earthen backstop berms to be removed contain an unknown quantity of lead in the form of bullet fragments. The soil from these berms would be sifted to remove lead bullet fragments and the soil would be tested for lead levels. The recovered lead bullet debris would be recycled through the installations Qualified Recycling Program as outlined in the Hazardous Waste Management Plan. In addition, lead-contaminated demolition debris and soil would be separated from the waste stream and disposed of as hazardous waste at an USEPA-approved landfill in accordance with the installation's Hazardous Waste Management Plan (GFAFB 2008c) and all applicable Federal, state, and local regulations and policies.

Long-term, minor, adverse effects on hazardous materials and wastes would be anticipated as a result of operations at the Indoor Small Arms Range. The continued usage of lead-containing bullets at indoor firing ranges can create a significant quantity of lead dust. The overall quantity of lead dust would be mitigated by the installation of advanced HVAC systems in the proposed indoor facility and the renovated Machine Gun Range. Janitorial and maintenance staff is at the highest risk of exposure; however, secondary exposure to the user can occur if proper sanitation measures are not undertaken. The recovered lead bullet debris would be recycled through the installations Qualified Recycling Program as outlined in the Hazardous Waste Management Plan. In addition waste products collected through the general housekeeping efforts (e.g., mopping, dusting, and vacuuming) would be separated from the waste stream and disposed of as hazardous waste in accordance with the installation's Hazardous Waste Management Plan (GFAFB 2008c) and all applicable Federal, state, and local regulations and policies.

Safety. Short-term, minor, adverse effects could occur. Construction activities pose an increased risk of construction-related accidents, but this level of risk would be managed by adherence to established Federal, state, and local safety regulations. Workers would be required to wear protective gear such as ear protection, steel-toed boots, hard hats, gloves, and other appropriate safety gear. Construction areas would be fenced and appropriately marked with signs to prevent trespassing. Construction equipment and associated trucks transporting material to and from the construction sites would be directed to roads and streets that carry minimum vehicles. Therefore, no long-term, adverse impacts on safety would be expected.

Construction of the Indoor Small Arms Range would have long-term, beneficial impacts on safety. First, an indoor range would reduce many of the current safety hazards of the partially contained outdoor range. Lead-contaminated soil, which is contained in the range and earthen backstop, would be removed, thus reducing exposure to personnel. The contaminated soil would require appropriate characterization, handling, and disposal by qualified personnel. See **Section 4.4.1.3**, Hazardous Materials and Wastes, for more information regarding the proper handling and removal of lead.

Construction activities associated with the proposed Indoor Small Arms Range would occur within a QD arc associated with the hot refueling pad. To avoid potential impacts on workers and the installation mission, this project should be coordinated with Airfield Management.

The current CATM range does not have a proper industrial ventilation system to control contaminants (lead and carbon monoxide) during training. In addition, the current range is situated such that prevailing winds from the north are directed towards the shooter, which increases the likelihood of contamination in the breathing zones. The proposed Indoor Small Arms Range and renovation of the existing machine-gun range would install proper air filters to increase safety to range users. Therefore, long-term, beneficial effects on safety would be realized from the construction of indoor range.

Additional beneficial impacts on safety would occur since construction of the proposed range would reduce the Safety Danger Zones (SDZs), which are areas where there is a potential for ricochets to exit

the range and fall. Additionally, construction of the new range would eliminate future safety hazards to aircraft using the nearby runway.

4.4.3 Representative Infrastructure Projects

4.4.3.1 I1. Construct Access Road/Parking at Buildings 314 and 242

This project includes constructing an access road connecting the parking lots between Buildings 314 and Building 242 to align the three primary communications facilities in Buildings 102, 242, and 314. Known environmental constraints in relation to I1 are shown in **Figure 4-7**. In addition, the following provides a detailed environmental resource analysis of Project I1.

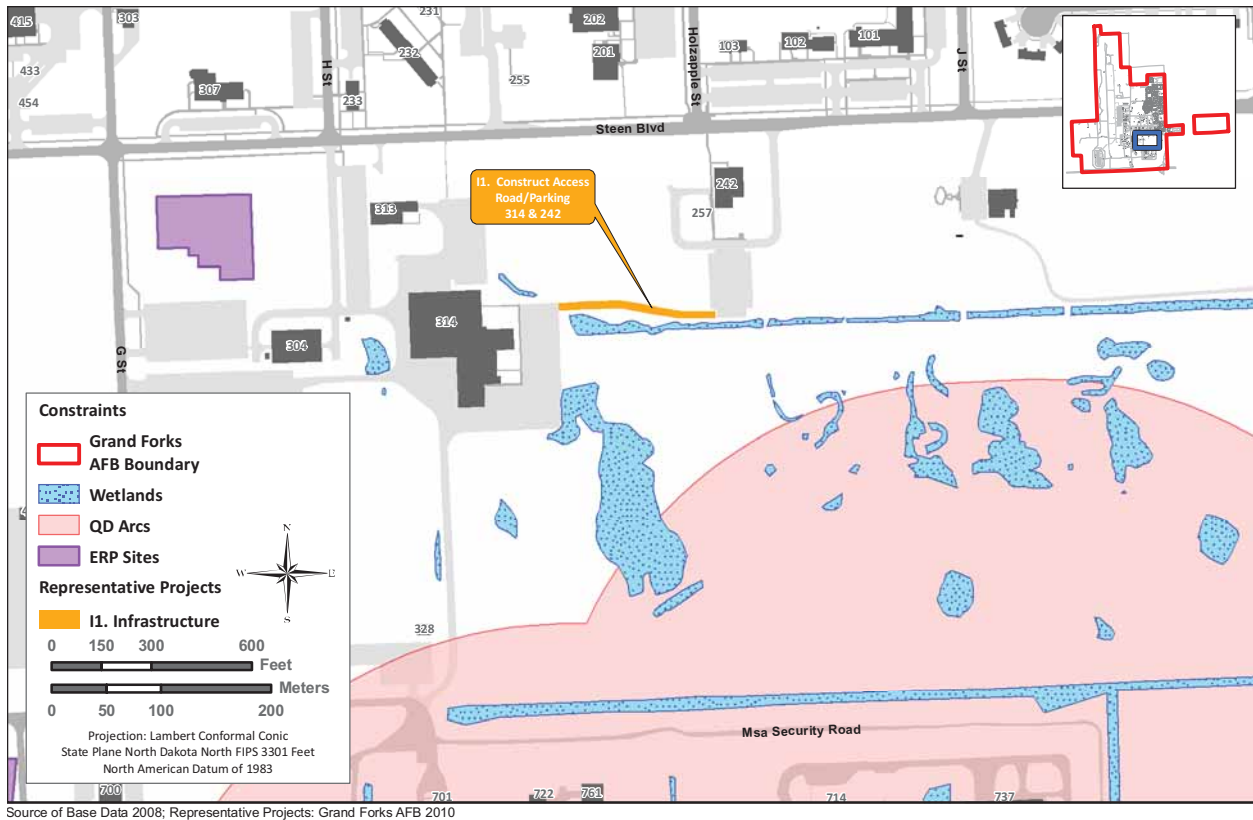


Figure 4-7. Environmental Constraints Associated with Project I1

Noise. Short-term, minor, adverse effects on the noise environment would be expected as a result of the construction of this facility. The noise emanating from construction equipment would be localized, short-term, and intermittent during machinery operations. Heavy construction equipment would be operated periodically during construction; therefore, noise levels from the equipment would fluctuate throughout the day. This area of Grand Forks AFB is used for industrial and administrative purposes; populations potentially affected by increased noise levels would primarily include USAF personnel in buildings approximately 400 feet or more from the proposed construction site. Expected noise levels would be comparable to a noisy metropolitan area (approximately 77 dBA). Residential populations potentially affected by noise would be at least 700 feet northeast of the construction area and would experience noise levels of approximately 72 dBA during construction activities.

No change in operations would be expected as a result of the construction of this building; therefore, no long-term effects on the ambient noise environment are anticipated.

Land Use. No effects on land use would be expected from the construction of an access road and repair of parking lots at Buildings 314 and 242. The new access road would be compatible with the Administrative land use category as it would provide better access to the facilities. The location and use of the access road and repair of existing parking lots would be compatible with existing and future land uses within the surrounding Administrative land use.

Air Quality. Short-term, minor, adverse impacts would be expected from construction emissions and land disturbance. Construction of Access Roads/Parking at Buildings 314 and 505 would result in minor impacts on regional air quality during construction activities, primarily from site-disturbing activities, operation of construction equipment, and asphalt paving operations. Appropriate fugitive dust-control measures would be employed during construction activities to suppress emissions. All emissions associated with construction operations would be temporary in nature. It is not expected that emissions from construction of the proposed access road and paving of the parking lots at Buildings 314 and 242 would contribute to or affect local or regional attainment status with the NAAQS. Emissions from the Proposed Action are summarized in **Table 4-11**. Emissions estimation spreadsheets and summary of the methodology used are included in **Appendix C**.

Table 4-11. Estimated Air Emissions Resulting from Project I1

Activity	NO _x tpy	VOC tpy	CO tpy	SO ₂ tpy	PM ₁₀ tpy	PM _{2.5} tpy	CO ₂ tpy
Construction Combustion	0.037	0.020	0.136	0.007	0.021	0.020	41.497
Construction Fugitive Dust	--	--	--	--	1.653	0.165	--
Haul Truck On-Road	0.012	0.009	0.036	0.001	0.015	0.004	3.122
Construction Commuter	0.028	0.027	0.248	< 0.001	0.003	0.002	32.870
Total I1 Emissions	0.376	0.056	0.421	0.008	1.691	0.191	74.490
Percent of AQCR 172 Inventory	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001 *

Note: * Percent of State of North Dakota CO₂ emissions.

Geological Resources. Constructing an access road and parking area at Buildings 314 and 242 would result in short- and long-term, minor, adverse effects on geology and soils. Short- and long-term effects during construction activities would be similar to effects on geology and soils as described for the three representative construction projects in **Section 4.4.2**. Soil erosion and sedimentation rates could increase in response to soil disturbance and compaction. Storm water runoff rates would increase as impervious surfaces increased. Therefore, storm water runoff quantity and velocity could increase. Construction BMPs would be implemented to minimize soil erosion; therefore, no significant adverse impacts on the soils would be anticipated.

Water Resources. Project I1 is adjacent to wetland and water resource areas. Impacts on adjacent wetlands and other water resources would be avoided through design, siting, and proper implementation of appropriate environmental protection measures and BMPs as presented in **Appendix G** that would ensure no effects on surrounding wetlands or other water resources would occur. Correspondence with regulatory and resource agencies and permitting would be obtained prior to commencing any ground-breaking construction activities.

Short-term effects would be minor and adverse, resulting from erosion and sedimentation of receiving water bodies. An approved ESCP would be followed, and BMPs in accordance with the CWA Final Rule (see **Section 3.5.1**) would be implemented to retain runoff and promote recharge of groundwater.

Impervious surfaces would increase, resulting in a long-term, minor, adverse effect on water resources due to the decrease in precipitation infiltration, and increased storm water discharge volume and velocity. A decrease in soil permeability and water infiltration associated with compaction can reduce the rate and volume of groundwater recharge in the affected area. Decreased soil permeability would alter natural storm water flow regimes. While the reduction in soil permeability and water infiltration rates as a result of soil compaction is an irretrievable adverse effect, the reduction of recharge area and rate of recharge for the groundwater basins would be negligible when compared with the total recharge area that is available. Additionally, increased storm water runoff volume and velocity could affect wetland hydrology, as more water would be introduced into wetlands. This could promote groundwater recharge if wetland outflow occurs primarily through groundwater flow. Impacts on wetland water quality and biota are analyzed in **Section 4.3.2.2, Biological Resources**.

Biological Resources. Effects on biological resources from construction of an access road and parking at Buildings 314 and 505 would be expected to be short-term, negligible to minor, and long-term, minor, and adverse.

Vegetation. The vegetation within and surrounding the proposed access road and parking area at Buildings 314 and 242 is predominantly composed of wet meadow species. The construction of an access road and parking area would be expected to have direct, short-term, negligible adverse effects on vegetation from trampling and temporary removal of this vegetation. The adjoining vegetation would be expected to regenerate once construction activities have ceased. Direct, long-term, minor, adverse effects on vegetation would also be expected from the construction of an access road and parking area. There are only two areas with wetland meadow habitat on the installation, making it one of the most uncommon vegetation communities on the installation. Additionally, depending on where the road and parking area are sited, trees and mixed grass prairie could also be removed.

Wildlife. The construction of an access road and parking area within this site would be expected to have short-term and long-term, negligible to minor, adverse effects on wildlife. Short-term, negligible, adverse effects on wildlife would be expected from this proposed project due to temporary disturbances from noise, construction activities, and heavy equipment use. High noise events could cause wildlife to engage in escape or avoidance behaviors, resulting in short-term, negligible, adverse effects. The area of disturbance would be relatively small in size and in a developed area where disturbances are common. Therefore, wildlife in the vicinity would be expected to be habituated to frequent disturbances. Most wildlife species in the demolition vicinity would be expected to quickly recover once the demolition noise and disturbances have ceased.

Long-term, minor, adverse effects on wildlife would be expected from the permanent loss of wildlife habitat from the construction of road and parking area at Buildings 314 and 242. The proposed site is situated in one of two wet meadow habitats on the installation. As this is an uncommon habitat, its value to certain wildlife species is presumed to be relatively high. The proposed project could involve removal of trees, which are also fairly uncommon on the installation. In addition, construction of a roadway that would cross the wet meadow habitat would fragment this habitat, resulting in additional long-term, minor, adverse effects on several species of wildlife.

Protected and Sensitive Species. Short-term, negligible to minor, adverse effects on protected and sensitive species would be expected from the construction of an access road and parking area due to temporary disturbances from noise, construction activities, and heavy equipment use. High noise events

could cause these species to engage in escape or avoidance behaviors, resulting in short-term, negligible, adverse effects. Short-term, minor adverse effects could be expected if construction activities prevented or disturbed nesting activities by state-listed or migratory birds. The areas of disturbance would be relatively small in size and in a developed area where disturbances are common. Therefore, any existing protected or sensitive species in the vicinity would be expected to be habituated to frequent disturbances. Most sensitive species in the construction vicinity would be expected to quickly recover once the construction noise and disturbances have ceased. Provided Grand Forks AFB follows the BMPs outlined in **Section 4.3.6, Protected and Sensitive Species** (e.g., perform ground-breaking activities outside of nesting season), short-term, adverse impacts on protected and sensitive species would be minimized.

Long-term, minor, adverse effects on protected and sensitive species could be expected from the permanent removal of habitat occurring within the proposed road and parking area locations. The proposed site is situated in one of two wet meadow habitats on the installation. As this is an uncommon habitat, its value to certain wildlife species is presumed to be relatively high. In addition, construction of a roadway that would cross the wet meadow habitat could lead to fragmentation of this habitat, resulting in additional long-term, minor, adverse effects.

Wetland Habitat. The proposed project site is located north of jurisdictional waters of the United States associated with a prairie pothole and a drainage ditch (see **Figure 4-7**). However, no adverse impacts on wetlands or other jurisdictional waters of the United States would be expected from this proposed infrastructure project. Project design would be coordinated with 319 CES/CEA to avoid any potential effects on adjacent wetlands and other jurisdictional waters of the United States. Adherence to an ESCP and SWPPP should prevent surface water degradation. Assuming appropriate environmental protection measures and BMPs as outlined in **Appendix G** are implemented during construction activities, no adverse effects on receiving wetlands or other waters of the United States would be expected. In the event of a spill, procedures outlined in the Grand Forks AFB's SPCC Plan would be followed to contain and clean up a spill quickly (see **Sections 3.10** and **4.3.10** for discussions on hazardous materials and wastes).

Cultural Resources. Short-term, minor, adverse and long-term, negligible effects would be anticipated from construction of an Access Road and Parking at Buildings 314 and 242. The proposed project site is adjacent to Building 313, an NRHP-eligible building. The southeastern corner of Building 313 is approximately 375 feet from the northwestern corner of the existing parking at Building 314 and approximately 875 feet from the existing parking at Building 242. Short-term effects during the construction period can include dust, noise, and vibration; however, these would be temporary and would not persist after construction is completed. The new construction would not be expected to affect the historic setting of Building 313, due to the project parameters, existing contours, and surrounding setting.

There are no known NRHP-eligible archaeological sites in the APE for this project and no archaeological resources would be affected by the action. The project area has a low probability for buried cultural resources due to previous disturbance. Additionally, given the nature of the project, only surface soils would be disturbed. If cultural materials or human remains are discovered inadvertently during construction, Grand Forks AFB would take appropriate actions to protect or minimize impacts in compliance with Federal laws and regulations as outlined in the ICRMP for Grand Forks AFB.

No known resources of traditional, religious, or cultural significance to Native American tribes are present at Grand Forks AFB. If resources of traditional, religious, or cultural significance to Native American tribes are identified in the vicinity of the project area, Grand Forks AFB would avoid, minimize, or mitigate any impacts from the Proposed Action on those resources.

Socioeconomics and Environmental Justice. Short-term, minor, beneficial effects on socioeconomic resources would be expected from the construction of the proposed Access Road/Parking at Buildings 314 and 242. While it is assumed that construction materials would be sourced locally and local contractors would be used, some of the construction might be completed by soldiers stationed at Grand Forks AFB. The construction should not outstrip the local supply of workers as there are approximately 5,000 construction workers in the GFMSA (USCB 2000). Construction activities would occur entirely on Grand Forks AFB and would have little potential to adversely affect off-installation residents. No long-term effects on socioeconomic resources or environmental justice are expected to result from construction of the Access Road/Parking at Buildings 314 and 242.

Infrastructure. Short-term, negligible, adverse effects would be expected as a result of the generation of as much as 57 tons of debris from construction (calculated using the density of asphalt [USEPA 2009b, Murphy and Chaterjee 1976]). This is a short-term, adverse effect in that debris would only be generated during construction activities; however, debris that is not recycled would be taken to the landfill, which would be considered a long-term, irreversible, adverse effect. Long-term, negligible effects on infrastructure would be expected from the proposed construction of new pavements and resurfacing of existing parking lots.

Hazardous Materials and Waste. Short-term, minor, adverse effects would be expected from the use of hazardous materials during the construction process. Contractors would be responsible for the management of hazardous materials and petroleum product usage, which would be handled in accordance with Federal, state, and USAF regulations. Contractors must report the use of hazardous materials to the HAZMART, including pertinent information (e.g., MSDSs). If a material that is less hazardous can be used, the HAZMART should make these recommendations.

No long-term effects on hazardous materials and wastes would be anticipated as a result of Constructing Access Roads/Parking at Buildings 314 and 505. The proposed access road and parking would not generate new waste streams; therefore, no modifications to Grand Forks AFB permits or hazardous materials or wastes would be expected. All hazardous materials and wastes created from the construction of the proposed access road and repaving of the parking lots would be in compliance with the installation's Hazardous Waste Management Plan (GFAFB 2008c) and all applicable Federal, state, and local regulations and policies.

Safety. Short-term, minor, adverse and long-term, beneficial effects could occur. Construction activities pose an increased risk of construction-related accidents, but this level of risk would be managed by adherence to established Federal, state, and local safety regulations. Workers would be required to wear protective gear such as ear protection, steel-toed boots, hard hats, gloves, and other appropriate safety gear. Construction areas would be fenced and appropriately marked with signs to prevent trespassing. Construction equipment and associated trucks transporting material to and from the construction sites would be directed to roads and streets that carry minimum vehicles. Therefore, no long-term, adverse impacts on safety would be expected.

4.4.3.2 I2. Repair HVAC-GSHP at Building 652

The current HVAC system at Building 652 is nearing the end of its useful life, which is contributing to large temperature swings for critical electronic equipment and personnel. The proposed project would include removing the existing HVAC systems and installing GSHPs to the east of Building 652. The system would be installed using a vertical configuration, using 10 boring holes for pipeline installation at a depth of 200 to 250 feet. The pipeline would be approximately 6 inches in diameter and would be spaced 5 meters (16 feet) apart in a closed-loop system. Bentonite clay would be injected between the pipeline and the boring hole walls to ensure an adequate seal. The system would use a water and

antifreeze solution for the closed-loop system, and water within the system would periodically be replaced. An HVAC-GSHP system would be in alignment with the Air Force Infrastructure Energy Strategic Plan to reduce energy costs by 20 percent by 2020. Known environmental constraints in relation to Project I2 are shown in **Figure 4-8**. In addition, the following provides a detailed environmental resource analysis of Project I2.

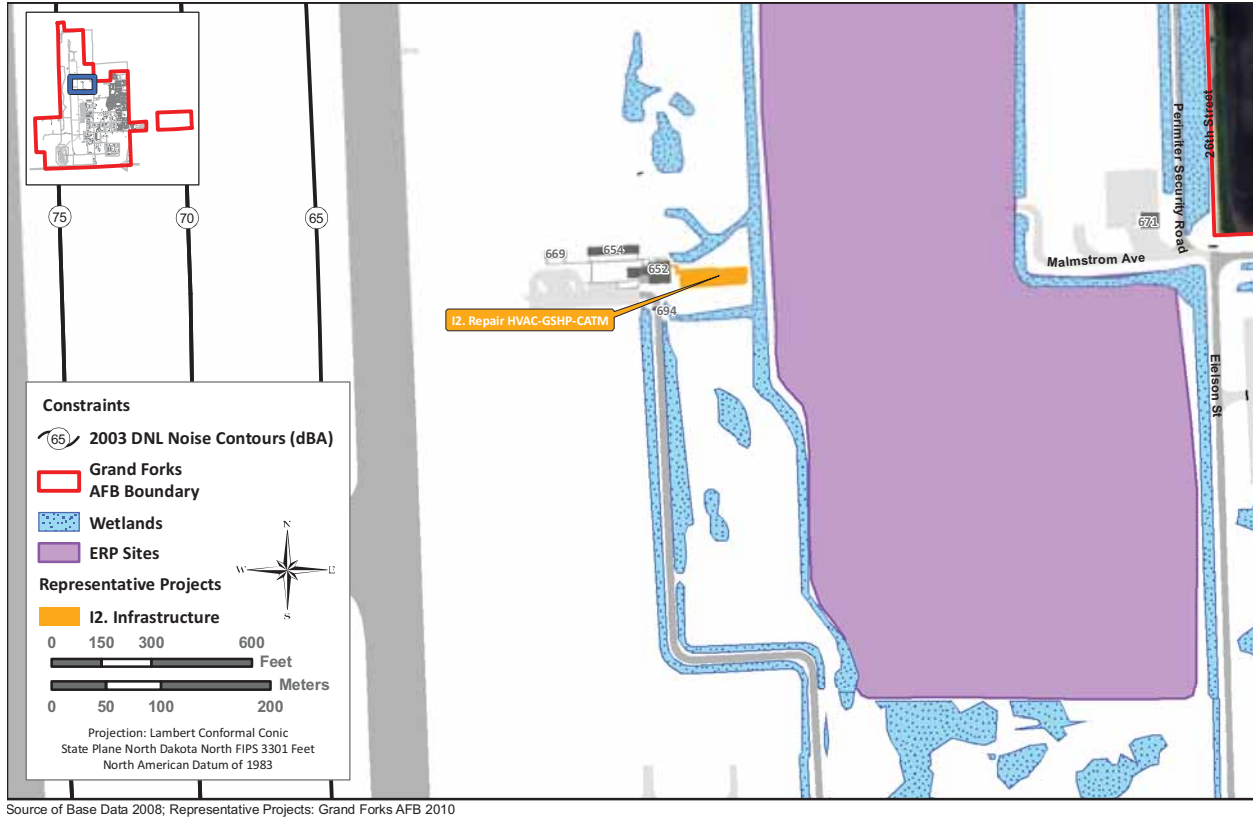


Figure 4-8. Environmental Constraints Associated with Project I2

Noise. Short-term, minor, adverse effects on the noise environment would be expected as a result of the renovation of this facility. The noise emanating from construction equipment and small electrical tools would be localized, short-term, and intermittent during machinery operations. Heavy construction equipment would be operated periodically during construction; therefore, noise levels from the equipment would fluctuate throughout the day. This area of Grand Forks AFB is used for industrial purposes; populations potentially affected by increased noise levels would primarily include USAF personnel continuing to work within the building in proximity to the source of the construction noise. Expected noise levels would be comparable to a very noisy metropolitan area (approximately 92 dBA). No changes in operations would be expected as a result of the installation of the GSHP; therefore, no long-term effects on the ambient noise environment are anticipated.

Land Use. No effects on land use would be expected from this initiative associated with repair of this energy conservation project. The proposed project would be compatible with the existing Industrial land use category as it would provide a more efficient and sustainable HVAC system. Land use for the proposed site where the project Repair HVAC-GSHP at Building 652 (Project I2) would be implemented is classified as Industrial; proposed future land use for this site would be Airfield (USAF 2006). This change would be considered compatible as it is important that the industrial land uses be near aircraft operations and maintenance for ease of cargo transfer (USAF 1998).

The energy conservation project would be compatible with existing and future land uses within the surrounding Industrial and Open Space land uses.

Air Quality. Short-term, minor, adverse impacts would be expected from construction emissions and land disturbance. Installation of the HVAC-GSHP would result in minor impacts on regional air quality during construction activities, primarily from site-disturbing activities and operation of construction equipment. Appropriate fugitive dust-control measures would be employed during construction activities to suppress emissions. All emissions associated with construction operations would be temporary in nature. It is not expected that emissions from construction of the proposed energy conservation project to repair HVAC and GSHPs at CATM would contribute to or affect local or regional attainment status with the NAAQS. Emissions from the Proposed Action are summarized in **Table 4-12**. Emissions estimation spreadsheets and summary of the methodology used are included in **Appendix C**.

Table 4-12. Estimated Air Emissions Resulting from Project I2

Activity	NO _x tpy	VOC tpy	CO tpy	SO ₂ tpy	PM ₁₀ tpy	PM _{2.5} tpy	CO ₂ tpy
Construction Combustion	0.021	0.001	0.008	< 0.001	0.001	0.001	2.471
Construction Fugitive Dust	--	--	--	--	0.153	0.008	--
Haul Truck On-Road	0.001	< 0.001	0.002	< 0.001	0.001	< 0.001	0.144
Construction Commuter	0.022	0.022	0.198	< 0.001	0.002	0.001	26.296
Total I2 Emissions	0.043	0.024	0.208	0.001	0.157	0.010	28.911
Percent of AQCR 172 Inventory	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001 [*]

Note: ^{*} Percent of State of North Dakota CO₂ emissions.

Geological Resources. Short-term, minor, adverse and long-term, negligible effects on geology and soils would be expected from implementing the ground source heat pump. Installation of the heat pump would entail earthmoving and digging. Pipes would be installed to a depth around 200 to 250 feet (GFAFB 2009d). A vertical configuration would be installed. During installation activities, soils would be disturbed and vegetation could be removed. Short-term, minor, adverse effects would be anticipated from the disturbance of soil through grading, filling, and trenching activities. Vegetation could be inadvertently removed by construction equipment. Soil erosion and sedimentation rates could increase during construction activities, and storm water runoff would increase in quantity and velocity. BMPs would be implemented to minimize impacts on installation of the ground source heat pump on geology and soils.

Long-term effects on geology and soils would be expected to be negligible once the ground source heat pump is in place. The pipeline would be surrounded by bentonite clay (a shrink-swell clay) to secure the pipeline. The bentonite could interfere with the quantity of soil moisture and associated functions such as abundance of microbial activity in the soil adjacent to the clay. However, this would be anticipated to be a negligible impact.

Water Resources. Short-term, minor, adverse and long-term, negligible effects would be expected on water resources from installing the ground source heat pump system. During installation, construction equipment would remove vegetation from the surface and disturb soil to a depth of 200 to 250 feet. This would increase rates of soil erosion and sedimentation, and could result in increased storm water runoff

and velocity. Increased runoff volume and velocity could impact hydrology of the small wetland (drainage ditch) to the east of the facility.

Project I2 is adjacent to wetland and water resource areas. Impacts on adjacent wetlands and other water resources would be avoided through design, siting, and proper implementation of appropriate environmental protection measures and BMPs as presented in **Appendix G** that ensure no effects on surrounding wetlands or other water resources would occur. In addition, a buffer surrounding the wetland would be developed as appropriate and in accordance with 319 CES/CEA. Correspondence with regulatory and resource agencies and permitting would be obtained prior to commencing any ground-breaking construction activities. In addition, storm water BMPs would ultimately attenuate the potential adverse effects the proposed HVAC-GSHP system could have on water quality and quantity.

Water supply would be affected as water would be pushed into the system for use in the closed-loop configuration, and also to hydrate the bentonite clay used to seal the pipes once they are in place in the boring holes. However, this would be expected to be a very minor use of water supply.

Long-term, negligible effects would be expected once installation activities have been completed and vegetation has been reestablished. Rates of erosion, sedimentation, runoff volume, and runoff velocity would return to normal conditions prior to ground source heat pump implementation. The HVAC-GSHP system would periodically need additional water pumped into the system to replace older water. The older water could mineralize over time and would need to be replaced. This would not be a significant effect on the installation's water supply.

Biological Resources. No impacts on biological resources would be expected to occur from installing a GSHP.

Vegetation. As this project would involve work indoors or immediately outside of the facility in paved areas, no effects on vegetation would be expected from the repair of the HVAC-GSHP at Building 652.

Wildlife. As this project would involve work indoors or immediately outside of the facility in paved areas, no effects on wildlife would be expected.

Protected and Sensitive Species. As this project would involve work indoors or immediately outside of the facility in paved areas, no effects on protected or sensitive species would be expected.

Wetland Habitat. The proposed HVAC-GSHP at Building 652 project site is surrounded by wetlands and jurisdictional waters of the United States associated with a prairie pothole and drainage ditches (see **Figure 4-8**). However, no adverse impacts on wetlands or other jurisdictional waters of the United States would be expected from this proposed infrastructure project. Project design would be coordinated with 319 CES/CEA to avoid any potential effects on surrounding wetlands and other jurisdictional waters of the United States. Adherence to an ESCP and SWPPP should prevent surface water degradation. Assuming appropriate environmental protection measures and BMPs as outlined in **Appendix G** are implemented during construction activities, no adverse effects on receiving wetlands or other waters of the United States would be expected. In the event of a spill, procedures outlined in the Grand Forks AFB's SPCC Plan would be followed to contain and clean up a spill quickly (see **Sections 3.10** and **4.3.10** for discussions on hazardous materials and wastes).

Cultural Resources. Short-term, minor, adverse, and long-term, negligible effects would be expected from implementing the proposed HVAC-GSHP at Building 652. Building 652 was built in 1970 and was not evaluated in the 1996 Cold War inventory as it was considered not to meet the exceptional significance requirements for Criterion Consideration G. It is located approximately 200 feet south of Building 313, a potentially NRHP-eligible building. Short-term effects during work on the project can include dust, noise, and vibration; however, none should persist after the project is completed. The

project would not be expected to affect the historic setting of Building 313, due to the nature of the equipment being installed.

There are no known NRHP-eligible archaeological sites in the APE for this project and no archaeological resources would be affected by the action. Due to the extensive excavation necessary for the ground source heat pumps and piping, the potential exists for encountering subsurface cultural materials. If cultural materials or human remains are inadvertently discovered during construction, Grand Forks AFB would take appropriate actions to protect or minimize impacts in compliance with Federal laws and regulations as outlined in the ICRMP for Grand Forks AFB.

No known resources of traditional, religious, or cultural significance to Native American tribes are present at Grand Forks AFB. If resources of traditional, religious, or cultural significance to Native American tribes are identified in the vicinity of the project area, Grand Forks AFB would avoid, minimize, or mitigate any impacts from the Proposed Action on those resources.

Socioeconomics and Environmental Justice. Short-term, minor, beneficial effects on socioeconomic resources would be expected from the proposed construction of the HVAC-GSHP at Building 652. While it is assumed that construction materials would be sourced locally and local contractors would be used, some of the construction might be completed by soldiers stationed at Grand Forks AFB. The construction should not outstrip the local supply of workers as there are approximately 5,000 construction workers in the GFMSA (USCB 2000). Construction activities would occur entirely on Grand Forks AFB and would have little potential to adversely affect off-installation residents. No long-term effects on socioeconomic resources or environmental justice are expected to result from construction of the HVAC-GSHP.

Infrastructure. Short-term, negligible, adverse effects on the heating and cooling system, natural gas, and electrical grid during construction would be expected. Short-term interruptions in these services could be experienced when buildings are disconnected from the old HVAC system, and reconnected to the new GSHP system.

Long-term, negligible to minor, beneficial effects would be realized through the installation of the HVAC-GSHP for CATM through long-range energy savings. The Proposed Action would result in a reduced demand of electrical and natural gas utilities on the central heating and cooling system.

Hazardous Materials and Waste. Short-term, minor, adverse effects would be expected from the use of hazardous materials during the construction process. Contractors would be responsible for the management of hazardous materials and petroleum product usage, which would be handled in accordance with Federal, state, and USAF regulations. Contractors must report the use of hazardous materials to the HAZMART, including pertinent information (e.g., MSDSs). If a material that is less hazardous can be used, the HAZMART should make these recommendations.

This project includes the installation of a closed-loop HVAC-GSHP. Grand Forks AFB intends to use a water and anti-freeze mixture in response to the local climate. No adverse environmental effects would be expected; however, if the closed-loop system is compromised and the water and anti-freeze mixture is released, the system would be halted. To minimize the impacts on groundwater from potential compromise of the closed-loop system, the casing would be grouted to prevent water migration and a leak detection method would be installed.

Additionally, long-term, minor, adverse effects on hazardous materials and wastes management would be anticipated as a result of the proposed HVAC-GSHP. Since the proposed HVAC-GSHP would be a closed-loop system, the water and anti-freeze mixture would only need to be changed infrequently; therefore no modifications to Grand Forks AFB permits or hazardous materials or wastes would be expected. All hazardous materials and wastes created from the construction and operation of the

proposed HVAC-GSHP would be in compliance with the installation's Hazardous Waste Management Plan (GFAFB 2008c) and all applicable Federal, state, and local regulations and policies.

Safety. Short-term, minor, adverse, and long-term, beneficial effects could occur. Construction activities pose an increased risk of construction-related accidents, but this level of risk would be managed by adherence to established Federal, state, and local safety regulations. Workers would be required to wear protective gear such as ear protection, steel-toed boots, hard hats, gloves, and other appropriate safety gear. Construction areas would be fenced and appropriately marked with signs to prevent trespassing. Construction equipment and associated trucks transporting material to and from the construction sites would be directed to roads and streets that carry minimum vehicles. Therefore, no long-term, adverse impacts on safety would be expected.

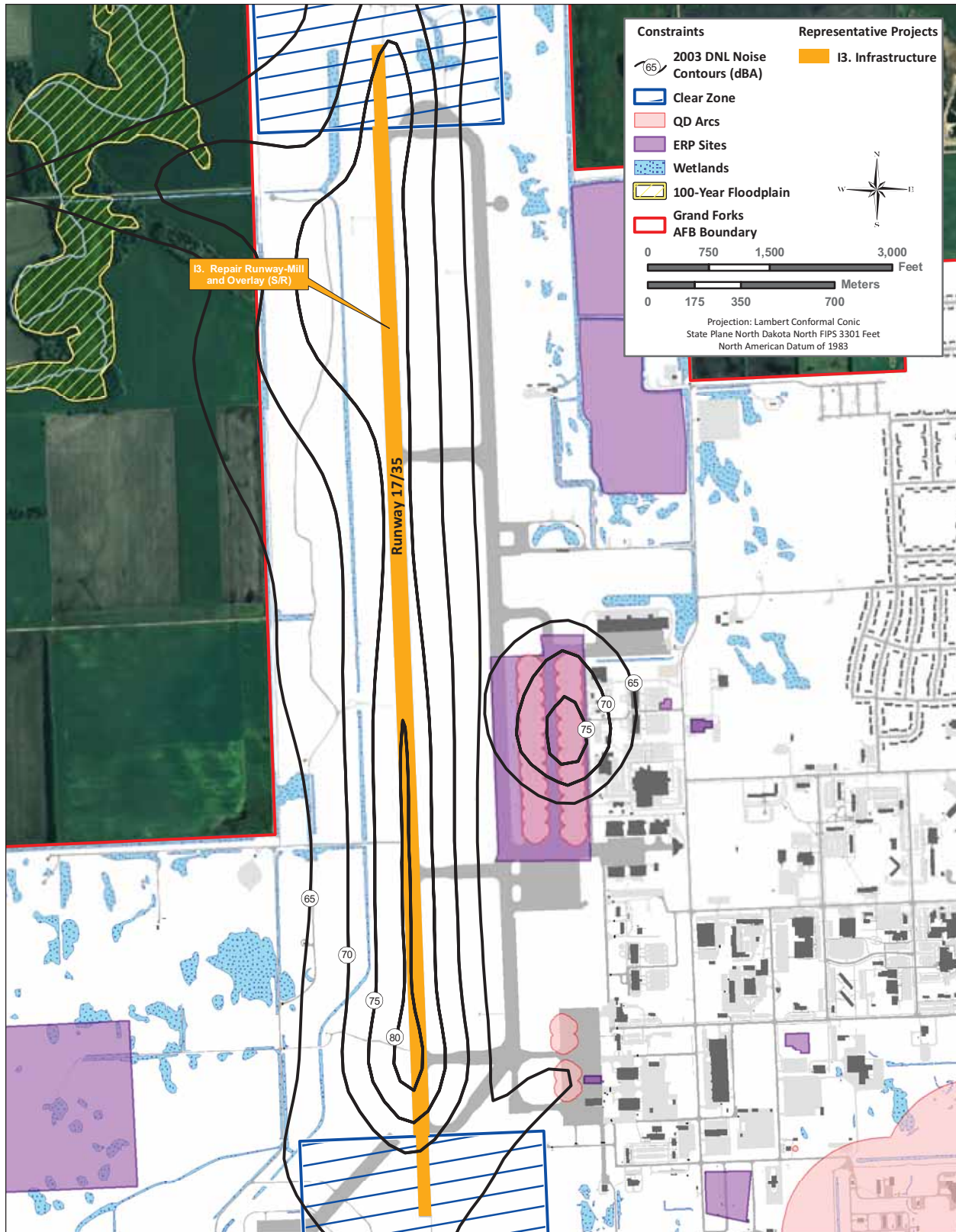
4.4.3.3 I3. Repair Runway-Mill and Overlay (S/R)

This project involves repairing Runway 17/35 by milling and overlaying concrete pavement and asphalt shoulders that have deteriorated over time, show signs of cracking, or do not meet current USAF and FAA airfield pavement requirements. Known environmental constraints in relation to I3 are shown in **Figure 4-9**. In addition, the following provides a detailed environmental resource analysis of Project I3.

Noise. No significant changes would be expected as a result of the runway mill and overlay. The noise emanating from the proposed project would be localized, short-term, and intermittent during construction equipment and machinery operations. Heavy construction equipment would be operated periodically during the project, which would limit the duration of increased noise levels. This area of Grand Forks AFB is used for airfield activities where the dominant component of the noise environment is from aircraft operations. Populations potentially affected by noise would be at least 2,000 feet away, so increases in noise levels from construction would be minor in comparison with the existing airport environment. No changes in operations would be expected as a result of the construction of this building; therefore, no long-term effects on the ambient noise environment are anticipated.

Land Use. Short-term, negligible, adverse effects on land use would be expected from the mill and overlay of Runway 17/35. This infrastructure project would be within the Airfield land use category at Grand Forks AFB, and the future land use is not expected to change. The project would support and enhance the current land use. Due to its location on the runway, this project would occur within established noise zones (primarily within the DNL of 75 to 79 dBA noise zones); however, runway repair is permitted and compatible. The project would require minor inconveniences as airfield activities would need to be scheduled around repair work; however, the work would be short-term in nature. Present and future land uses would be compatible and no changes in land use functions would be expected.

Air Quality. Short-term, minor, adverse impacts would be expected from construction emissions and land disturbance. The proposed runway repair would result in minor impacts on regional air quality during construction activities, primarily from site-disturbing activities, operation of construction equipment, and concrete and asphalt paving operations. Appropriate fugitive dust-control measures would be employed during construction activities to suppress emissions. All emissions associated with construction operations would be temporary in nature. It is not expected that emissions from construction of the proposed repair of the runway would contribute to or affect local or regional attainment status with the NAAQS. Emissions from the proposed runway repair are summarized in **Table 4-13**. Emissions estimation spreadsheets and summary of the methodology used are included in **Appendix C**.



Sources: Base Data 2008; Representative Projects: Grand Forks AFB 2010; Aerial Photo: ArcGIS Microsoft Virtual Earth Premium Online Service, 2009.

Figure 4-9. Environmental Constraints Associated with Project I3

Table 4-13. Estimated Air Emissions Resulting from Project I3

Activity	NO _x tpy	VOC tpy	CO tpy	SO ₂ tpy	PM ₁₀ tpy	PM _{2.5} tpy	CO ₂ tpy
Construction Combustion	5.104	0.295	2.074	0.102	0.312	0.303	630.130
Construction Fugitive Dust	--	--	--	--	107.169	10.717	--
Haul Truck On-Road	0.184	0.133	0.542	0.015	0.219	0.057	46.671
Construction Commuter	0.110	0.110	0.992	0.001	0.010	0.007	131.482
Total I3 Emissions	5.399	0.538	3.607	0.118	107.711	11.083	808.283
Percent of AQCR 172 Inventory	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001 *

Note: * Percent of State of North Dakota CO₂ emissions.

Geological Resources. Short-term, negligible effects on geology and soils would be expected from repairing the runway. Repair of the runway could entail removal of some vegetation during repair activities as equipment is moved over vegetated soil. This would result in an increase in soil erosion and sedimentation until repair activities are complete and vegetation has been reestablished. No long-term effects would be anticipated from the runway repair as soil would not be disturbed and there would not be an increase in impervious surfaces. Construction BMPs would be implemented to minimize soil erosion and runoff; therefore, no significant adverse impacts on the soils would be anticipated.

Water Resources. Repairs to the runway would be expected to result in short-term, negligible effects on water resources. Short-term effects could occur from the use of water supply during repair activities, but this would be negligible. Erosion and sedimentation controls and storm water management practices consistent with the SWPPP would be implemented to retain runoff onsite during construction activities. The SWPPP and BMPs in accordance with the CWA Final Rule (see **Section 3.5.1**) would minimize potential for adverse effects on offsite or downstream water resources. No long-term effects would be anticipated.

Biological Resources. Repair of the runway would be expected to result in short-term, minor, adverse impacts on biological resources. No long-term effects would be expected.

Vegetation. The repair of the runway would be expected to have direct, short-term, negligible, adverse effects on vegetation. The vegetation surrounding the proposed project is regularly mowed mixed-prairie grassland; therefore, short-term effects on adjoining vegetation from trampling and temporary removal are anticipated to be negligible as this vegetation is not unique or rare within the installation or the region. As there is no vegetation on the runway itself, no long-term adverse effects on vegetation would be expected.

Wildlife. The repair of the runway would be expected to have short-term, minor, adverse effects on wildlife due to temporary disturbances from noise, milling, and heavy equipment use. High noise events could cause wildlife to engage in escape or avoidance behaviors. According to the 2007 Migration and Breeding Bird Surveys, the habitats with the most observed bird species occurring on the main installation include shallow marshes (prairie potholes and drainage ditches) and the open grassland (USAF 2008e). Most of these habitat types occur in the northern and western portions of the installation, and are in relatively close proximity to the runway. Therefore, temporary disturbances from this project would be expected to adversely affect several wildlife species, particularly grassland birds. However, due to the proximity of these habitats to the runway, it is assumed that wildlife in these habitats are habituated

to frequent high noise events from aircraft, and are anticipated to return once the demolition noise and disturbances have ceased.

As the proposed runway repair would not involve removal or alteration of existing habitat, no long-term adverse effects on wildlife would be expected.

Protected and Sensitive Species. The repair of the runway could be expected to have short-term, minor, adverse effects on protected and sensitive species due to temporary disturbances from noise, milling, and heavy equipment use. High noise events could cause wildlife to engage in escape or avoidance behaviors. Continuous disturbances could prevent or disturb nesting activities of migratory birds, resulting in additional short-term, minor, adverse impacts. According to the 2007 Migration and Breeding Bird Surveys, the habitats with the most observed bird species occurring on the main installation include shallow marshes (prairie potholes and drainage ditches) and the open grassland (USAF 2008c). Large tracts of native grassland provide the best habitat for many of the “conservation priority listed” grassland birds (USAF 2008c). Most of these habitat types occur in the northern and western portions of the installation, and are in relatively close proximity to the runway. Therefore, temporary disturbances from this project would be expected to adversely affect several wildlife species, particularly grassland birds. However, due to the proximity of these habitats to the runway, it is assumed that wildlife in these habitats are habituated to frequent high noise events from aircraft, and are anticipated to return once the demolition noise and disturbances have ceased.

Wetland Habitat. There are no wetlands within or near the runway on Grand Forks AFB. Therefore, no effects on wetlands would be expected from the repair of the runway.

Cultural Resources. No historic properties would be affected by the repair of the runway with mill and overlay. The proposed project site is adjacent to Building 606, an NRHP-eligible building, but at a distance of approximately 1,800 feet (0.35 miles). Therefore, the project is distant enough to pose no direct or indirect effects on Building 606 or its historic setting.

There are no known NRHP-eligible archaeological sites in the APE for this project and no archaeological resources would be affected by the action. The site of the runway is surrounded by an area previously surveyed in 1996 (USAF 2008d). Archaeological sites or isolated finds have been previously identified adjacent to the western (32GFX304, 32GF124, and 32GFX329), northern (32GF3073 and 32GF3223), and northeastern (32GF3075) portions of the runway; however these have been deemed ineligible for NRHP listing by Grand Forks AFB with the concurrence of North Dakota SHPO. If cultural materials or human remains are discovered inadvertently during construction, Grand Forks AFB would take appropriate actions to minimize impacts in compliance with Federal laws and regulations as outlined in the Grand Forks ICRMP.

No known resources of traditional, religious, or cultural significance to Native American tribes are present at Grand Forks AFB. If resources of traditional, religious, or cultural significance to Native American tribes are identified in the vicinity of the project area, Grand Forks AFB would avoid, minimize, or mitigate any impacts from the Proposed Action on those resources.

Socioeconomics and Environmental Justice. Short-term, minor, beneficial effects on socioeconomic resources would be expected from the proposed runway mill and overlay repair. While it is assumed that construction materials would be sourced locally and local contractors would be used, some of the construction might be completed by soldiers stationed at Grand Forks AFB. The construction should not outstrip the local supply of workers as there are approximately 5,000 construction workers in the GFMSA (USCB 2000). Construction activities would occur entirely on Grand Forks AFB and would have little

potential to adversely affect off-installation residents. No long-term effects on socioeconomic resources or environmental justice are expected to result from the proposed runway mill and overlay repair.

Infrastructure. Short-term, negligible to minor, adverse effects on utilities and other infrastructure systems would be expected from the proposed pavement demolition and construction of new pavement. Airfield traffic might have to be rerouted during construction activities creating a short-term, adverse impact on transportation. Short-term, adverse effects would be expected as a result of the generation of the debris from demolition and construction of the runway. This is a short-term, adverse effect as debris would be landfilled, which would be considered a long-term, irreversible, adverse effect. This adverse impact would be minimized due to the nature of the project (i.e., milling old pavement and overlaying) which reduces final debris weight. Long-term, major, beneficial effects would be expected by the improvement of airfield pavements.

Hazardous Materials and Waste. Short-term, minor, adverse effects would be expected from the use of hazardous materials during the construction process. Contractors would be responsible for the management of hazardous materials and petroleum product usage, which would be handled in accordance with Federal, state, and USAF regulations. Contractors must report the use of hazardous materials to the HAZMART, including pertinent information (e.g., MSDS). If a material that is less hazardous can be used, the HAZMART should make these recommendations.

No long-term effects on hazardous materials and wastes would be anticipated as a result of the proposed runway repair. The proposed runway repair would not generate new waste streams; therefore, no modifications to Grand Forks AFB permits or hazardous materials or wastes would be expected. All hazardous materials and wastes created from the repair, mill, and overlay of the runway would be in compliance with the installation's Hazardous Waste Management Plan (GFAFB 2008c) and all applicable Federal, state, and local regulations and policies.

Safety. Short-term, minor, adverse and long-term, beneficial effects could occur. Construction activities pose an increased risk of construction-related accidents, but this level of risk would be managed by adherence to established Federal, state, and local safety regulations. Workers would be required to wear protective gear such as ear protection, steel-toed boots, hard hats, gloves, and other appropriate safety gear. Construction areas would be fenced and appropriately marked with signs to prevent trespassing. Construction equipment and associated trucks transporting material to and from the construction sites would be directed to roads and streets that have low traffic volumes. Therefore, no long-term, adverse impacts on safety would be expected. Long-term, beneficial effects would be realized from the runway repair. Substandard portions of the runway would be improved thus increasing the safety of aircraft personnel.

Contractors working in or near the runway and the airfield must be aware of and follow flightline safety procedures. A portion of Project I3 runway repair activities would occur within a QD arc associated with the hot refueling pad. To avoid potential impacts on workers and the installation mission, this project would be coordinated with Airfield Management.

4.4.4 Analysis of All Proposed IDEA Projects

Table 4-14 summarizes the potential environmental consequences associated with the remainder of the installation development projects that are identified in **Tables 2-1, 2-2, and 2-3**, including the representative projects discussed above. The intent of the table in this section is to focus on those potential environmental consequences that would be expected as a result of location- or operation-specific activities. All demolition and construction activities generally would be expected to result in some temporarily increased noise, increased air emissions, potential for erosion and transport of sediment into

surface water bodies, generation of small amounts of hazardous materials and wastes, and generation of construction and demolition waste. All demolition and construction activities generally would be expected to result in minor beneficial effects on socioeconomics as a result of job creation and materials procurement. Furthermore, it should be assumed that demolition or renovation activities in older buildings have the potential to disturb ACM or LBP. The appropriate identification, handling, removal, and disposal of those materials would occur in accordance with existing Grand Forks AFB management plans and Federal, state, DOD, and USAF regulations and guidance. These types of short-term, construction-related effects are identified in **Section 4.3** in the general analysis and **Sections 4.4.1, 4.4.2, and 4.4.3** in the detailed analyses of the representative projects. Therefore, they are not identified as constraints to development in **Table 4-14** for each project. It is assumed that, in the absence of unique constraints, the potential environmental effects associated with the size of a demolition or construction project would be similar to those described in **Sections 4.4.1, 4.4.2, and 4.4.3**. The potential environmental consequences associated with implementation of all other projects are analyzed following **Table 4-14**. The potential constraints that are identified in **Table 4-14** (i.e., those not identified as “no or negligible effects”) are elaborated upon in the following analysis by resource area.

All construction and demolition activities would adhere to Grand Forks AFB’s existing plans and policies that have been identified and referenced throughout **Sections 2, 3, 4, and 7** of this IDEA. **Table 4-14** is not meant to substitute for or initiate coordination that might be required as a result of the proposed activities; but rather, it is meant to identify potential effects on sensitive resources. The following summarizes the potential adverse effects associated with constraints for the projects identified in **Tables 2-1, 2-2, and 2-3** and the existing management plans and policies regarding those affected resources.

Table 4-14. Potential Environmental Consequences from All Proposed Projects Listed in Tables 2-1, 2-2, and 2-3

Project Identification Number and Title	Noise	Land Use	Air Quality	Geological Resources	Water Resources	Wetlands	Biological Resources	Cultural Resources	Socioeconomics and Environmental Justice	Infrastructure	Hazardous Materials and Wastes	Safety
Representative Demolition Projects												
D1. Demolish MSA Revised Plan	♦	⊕	♦	♦ ESCP	♦ ⊕	- ^b	♦ / ⊕	♦	⊕	♦	-	♦
D2. Demolish Buildings 304 and 515 in support of Consolidated Security Forces	♦ / -	⊕	♦	♦ ESCP	⊕	-	⊕	-	⊕	⊕	-	♦
D3. Demolish Hangars 520, 521, 522, and 523	♦	⊕	♦	♦ ESCP	⊕	-	♦	-	⊕	-	-	♦
Other Demolition Projects												
D4. Demolish Family Housing PH6 (20 Units)	♦	⊕	♦	⊕	⊕	-	-	-	⊕	-	-	♦ LBP/ACM
D5. Demolish DRMO Facilities (432, 437)	♦	⊕	♦	⊕	⊕	-	-	-	⊕	-	-	♦ LBP/ACM
D6. Demolish Bunch and Gray Hall Dormitories	♦	⊕	♦	⊕	⊕	-	-	-	⊕	-	-	♦ LBP/ACM
D7. Demolish Building 663, Engine Test Cell Concrete Foundation	♦	⊕	♦	-	⊕	-	-	-	-	-	-	-
D8. Demolish Freedom Hall Dormitory	♦	⊕	♦	⊕	⊕	-	-	-	⊕	-	-	♦ LBP/ACM

Short Legend:

- No effects or negligible effects.

♦ Potential minor adverse effects.

⊕ Potential minor beneficial effects.

■ Potentially significant (greater magnitude than representative projects).

Project Identification Number and Title	Noise	Land Use	Air Quality	Geological Resources	Water Resources	Wetlands	Biological Resources	Cultural Resources	Socioeconomics and Environmental Justice	Infrastructure	Hazardous Materials and Wastes	Safety
Representative Construction Projects												
C1. Construct Consolidated Security Forces	◆	⊕	◆	◆ ESCP	◆	-	-	-	⊕	-	◆	◆
C2. Construct BCE Pavements and Maintenance Facility/Snow Barn	◆	⊕	◆	◆ ESCP	◆	◆ 401/404	-	-	⊕	-	◆	◆
C3. Construct Indoor Small Arms Range	◆ / ⊕	⊕	◆	◆ ESCP	◆	◆ 401/404	◆	◆	⊕	-	◆	◆
Other Construction Projects												
C4. Youth Center	◆	-	◆	◆ ESCP	◆	-	- / ◆	-	⊕	-	-	-
C5. Construct Dog Park MFH	◆	-	◆	-	-	-	-	-	-	-	-	-
C6. Construct Multi-Use Trail Along Eielson Street	-	-	◆	-	◆	- ^b	- / ◆	-	⊕	⊕	-	⊕
C7. Construct Base Dumpster Screens	-	-	◆	-	-	-	-	-	-	-	-	-
C8. Construct Integrated Munitions Maintenance Facility	◆	⊕	◆	◆ ESCP	◆	-	-	-	-	-	◆	⊕
C9. Add To Refueler Maintenance Building 303	◆	-	◆	◆ ESCP	◆	-	-	-	-	-	◆	-
C10. Construct CDC Dumpster Screen	◆	-	◆	-	-	-	-	-	-	-	-	-

Short Legend:

- No effects or negligible effects

◆ Potential minor adverse effects

⊕ Potential minor beneficial effects

■ Potentially significant (greater magnitude than representative projects)

Project Identification Number and Title	Noise	Land Use	Air Quality	Geological Resources	Water Resources	Wetlands	Biological Resources	Cultural Resources	Socioeconomics and Environmental Justice	Infrastructure	Hazardous Materials and Wastes	Safety
Other Construction Projects (continued)												
C11. Construct Base Engineer Admin/Shops/Contracting - Phases 1 and 2	♦	-	♦	♦ ESCP	♦	-	- / ♦	-	⊕	-	-	-
C12. Central Deployment Center	-	-	♦	♦ ESCP	♦	-	-	-	⊕	-	-	-
Representative Infrastructure Projects												
I1. Construct Access Road/Parking at Buildings 314 and 242	♦	⊕	♦	♦ ESCP	♦	^b	♦	♦	⊕	♦	♦	♦
I2. Energy Conservation: HVAC-GSHP-CATM-Building 652	♦	⊕	♦	♦ ESCP	♦	^b	-	♦	⊕	-	♦	♦
I3. Repair Runway-Mill and Overlay (S/R)	-	-	♦	-	-	-	♦	-	⊕	♦	♦	♦
Other Infrastructure Projects												
I4. Construct Curbs-Parking Lot TLF (143)	♦	-	♦	-		-	- / ⊕	-	-	-		-
I5. Repair CS Admin Parking Lot (S/R)	♦	-	♦	-	-	-	-	-	⊕	-	-	-
I6. Energy Conservation: Repair HVAC – GSHP - CS	♦	⊕	♦	♦ ESCP	♦	^b	-	♦	⊕	-	♦	♦

Short Legend:

- No effects or negligible effects

♦ Potential minor adverse effects

⊕ Potential minor beneficial effects

■ Potentially significant (greater magnitude than representative projects)

Project Identification Number and Title	Noise	Land Use	Air Quality	Geological Resources	Water Resources	Wetlands	Biological Resources	Cultural Resources	Socioeconomics and Environmental Justice	Infrastructure	Hazardous Materials and Wastes	Safety
Other Infrastructure Projects (continued)												
I7. Repair HVAC – Ground Source Heat Pump – Recycling Facility	◆	⊕	◆	◆ ESCP	◆	-	-	-	⊕	-	◆	◆

Short Legend:

- No effects or negligible effects.

⊕ Potential minor beneficial effects.

Notes:

a. Indicates reuse of existing building; additional construction might not be required.

Key:

401/404 = Section 401 and 404 permits could be required.

ACM = Asbestos-containing materials

ESCP = Erosion- and sediment-control plan

EX = Exclusion area

HAZ = Change in quantity or storage for hazardous materials or wastes

LBP = Lead-based paint

Acronyms:

BCE Base Civil Engineering

CATM Combat Arms Training and Maintenance

CDC Child Development Center

CS Communication Squadron

DRMO Defense Reutilization and Marketing Office

GSHP Ground Source Heat Pump

HVAC Heating, Ventilation, and Air Conditioning

MFH Military Family Housing

MSA Munitions Supply Area

PH6 Phase 6

S/R Sustainment/restoration

TLF temporary lodging facility

◆ Potential minor adverse effects.

■ Potentially significant (greater magnitude than representative projects).

b. Effects on wetlands would be avoided through design and BMPs.

NPDES = ESCPs recommended

SDZ = Surface Danger Zone

VS = Potentially affected viewshed

QD = Quantity-distance arc

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5. Cumulative and Adverse Impacts

5.1 Definition of Cumulative Effects

CEQ defines cumulative effects as the “impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions” (40 CFR 1508.7). Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time by various agencies (Federal, state, and local) or individuals. Informed decisionmaking is served by consideration of cumulative effects resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the reasonably foreseeable future. Reasonably foreseeable future actions consist of activities that have been approved and can be evaluated with respect to their effects.

5.2 Projects Identified With the Potential for Cumulative Effects

Cumulative impacts on environmental resources result from incremental effects of proposed actions, when combined with other past, present, and reasonably foreseeable future projects in the area. Cumulative impacts can result from individually minor, but collectively substantial, actions undertaken over a period of time by various agencies (Federal, state, and local) or individuals. Informed decisionmaking is served by consideration of cumulative impacts resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the reasonably foreseeable future.

The geographic ROI is an important consideration when discussing cumulative effects. For the purposes of this analysis, the ROI was determined to be Grand Forks AFB and the adjacent communities (i.e., Grand Forks Metropolitan Area and Grand Forks County).

The Grand Forks Metropolitan Area is at the eastern-central portion of Grand Forks County and serves as a regional center for northeastern North Dakota and northwestern Minnesota. Agriculture is the most important industry in Grand Forks County and the majority of the economy is driven by the generation or processing of agricultural products. Government services are also an important segment of the local economy. Overall, the future vision for Grand Forks County is to promote the majority of growth where municipal services are available and manage rural residential growth, while preserving agricultural and native resources. The vision for Grand Forks County is to develop a cohesive countywide land use pattern that ensures compatibility and functional relationships among activities and between jurisdictions. Future land use plans include the following (Grand Forks County 2006a):

- The Urban Expansion Area, adjacent to the Grand Forks Metropolitan Area, is anticipated to receive municipal services within the next 50 years. The Urban Expansion Area will be sized to accommodate growth through 2055.
- The aesthetics and environmental quality within the commercial and industrial land use area will be maintained and upgraded, where necessary.
- Growth occurring on a phased-basis, providing for a logical extension of urban and rural growth patterns and related community services.

An effort was undertaken to identify other projects for evaluation in the context of the cumulative effects analysis. This was further developed through review of public documents and information gained from the coordination with various applicable agencies.

The 319 ARW updates facilities at Grand Forks AFB on a continual basis. Planning efforts in the ROI include the actions described in **Tables 2-1, 2-2, and 2-3** of this EA, and those additional projects that are ongoing or planned in the vicinity of Grand Forks AFB. Grand Forks AFB and its tenant organizations undergo changes in mission and training requirements in response to defense policies, current threats, and tactical and technological advances; as such, facility and infrastructure requirements and funding priorities constantly change. However, projects shown in **Tables 2-1, 2-2, and 2-3** are in general representative of the projects that could be expected to be completed over the next 5 years.

An EIS is being prepared to analyze construction and infrastructure projects associated with the beddown of RPA. Ground-based improvements to support the RPA mission include construction, demolition, and repair and renovation projects including construction of a new four-bay hangar, communication towers, antennas, video surveillance systems, other communication infrastructure, and aviation gasoline fueling tanks; improvements to the Bravo Ramp; and demolition of Buildings 520 and 521. In addition, an EA analyzing the privatization of MFH at Grand Forks AFB is being prepared.

Numerous projects would be expected to occur concurrently, if implemented. The MFH construction, in combination with the RPA mission and installation development analyzed in this EA, would have cumulative effects on air quality, soils, water resources, and biological resources. Effects on air quality would occur from site preparation that would produce fugitive dust, and use of heavy construction equipment that would produce air emissions. These effects on air quality would be limited to Grand Forks AFB. Effects on air quality would be of a finite duration, lasting only during the period associated with site preparation, demolition, and construction activities. Effects on soils and water resources could occur from ground-disturbing activities during site preparation when soils could be eroded and sedimentation of nearby water bodies could occur. Effects would be reduced by implementing BMPs (see **Section 5.4**).

5.3 Cumulative Effects Analysis

Table 5-1 summarizes potential cumulative effects on the various resource areas from the Proposed Action when combined with other past, present, and reasonably foreseeable future activities. Only those actions are considered that are additive to those shown in **Tables 2-1, 2-2, and 2-3**, which are representative of the reasonably foreseeable projects that could be completed over the next 5 years.

5.4 Reasonable and Prudent Measures and Best Management Practices

The Proposed Action would not result in significant adverse effects on the land or the surrounding area. However, BMPs and other minimization measures would be implemented to eliminate or reduce adverse impacts.

General BMPs that might be included as parts of the Proposed Action are summarized as follows:

- Clearing and grubbing would be timed with construction to minimize the exposure of cleared surfaces. Such activities would not be conducted during periods of wet weather. Construction activities would be staged to allow for the stabilization of disturbed soils.
- Fugitive dust-control techniques such as soil watering and soil stockpiling would be used to minimize adverse effects. All such techniques would conform to applicable regulations.
- Soil erosion-control measures, such as soil erosion-control mats, silt fences, straw bales, diversion ditches, riprap channels, water bars, water spreaders, and hardened stream crossings, would be used as appropriate.

- Disturbance of environmental resources and topography would be minimized by integrating existing vegetation, trees, and topography into site design.
- Where feasible, areas of impervious surface would be minimized through shared parking, decked or structured parking, increased building height, or other measures as appropriate.
- Provisions would be taken to prevent pollutants from reaching the soil, groundwater, or surface water. During project activities, contractors would be required to perform daily inspections of equipment, maintain appropriate spill-containment materials on site, and store all fuels and other materials in appropriate containers. Equipment maintenance activities would not be conducted on the construction site.
- Physical barriers and “no trespassing” signs would be placed around the demolition and construction sites to deter children and unauthorized personnel. All construction vehicles and equipment would be locked or otherwise secured when not in use.
- Construction equipment would be used only as necessary during the daylight hours and would be maintained to the manufacturer’s specifications to minimize noise impacts.

Table 5-1. Cumulative Effects on Resources

Resource	Past Actions	Current Background Activities	Proposed Action	Known Future Actions	Cumulative Effects
Noise	Aircraft operations are a dominant component of the noise environment. Development is restricted to compatible uses when noise levels exceed 65 dBA.	Aircraft activities and small arms fire are the dominant noise sources.	Minor, short-term, adverse effects from construction and demolition. Minor, long-term increases in noise from an increase in aircraft and small arms range activity.	Continued increases in development and renovation could result in temporary increases in noise. Continued increases in small arms range use and aircraft operations could result in long-term increases in noise.	Aircraft activities along with small arms fire would remain the dominant noise sources. No significant effect.
Land Use	Past development practices have extensively modified land use.	Military installation, industrial, and open space land uses.	No change in overall land use.	No changes to current zoning or deviations from the General Plan would be anticipated.	Each project associated with the Proposed Action would be sited in a manner compatible with Grand Forks AFB's surrounding land uses. No significant effects.
Air Quality	Grand Forks County classified as being in attainment or as unclassifiable for all criteria pollutants.	Emissions from aircraft, vehicles, and stationary sources such as generators, boilers, hot water heaters, fuel storage tanks, gasoline service stations, surface coating/paint booths, and miscellaneous chemical usage.	Potential dust generation during construction and demolition activities and emissions due to asphalt paving activities.	Continued renovation and demolition could cause temporary effects. Continued increase in small arms range use and aircraft operations could result in long-term effects.	Minor, long-term, adverse effects on air quality. The magnitude of cumulative effects would remain low beyond completion of the demolition and construction components of the Proposed Action. No significant effects.

Resource	Past Actions	Current Background Activities	Proposed Action	Known Future Actions	Cumulative Effects
Geological Resources	Soils moderately impacted from previous disturbance and modification.	Storm water control measures that favor reinfiltration are used to minimize erosion and sedimentation during storm events.	Short-term effects from potential soil runoff and sedimentation during construction and demolition activities. Long-term effects from clearing vegetation, paving, and grading.	Continued demolition and construction could temporarily increase soil runoff and sedimentation. Continued clearing of vegetation could result in complete removal of soil or soil modification.	Increases in soil runoff and sedimentation would cease beyond the completion of demolition and construction activities. The effects from the long-term decline or total loss in soil productivity from clearing vegetation, paving, and grading would be minimized by revegetation. Effect not significant.
Water Resources	Surface water quality moderately impacted by past construction and demolition activities.	Pollution from industrial and municipal sources is generally moderate.	Potential sedimentation from construction and demolition activities. Increase in impervious surface area, potentially offset by demolition and removal of some impervious surface area. No projects would occur in floodplains.	Continued development of area could result in temporary sedimentation. Increase in impervious surfaces from new construction, potentially offset by demolition and removal of impervious surfaces.	Long-term effects from new construction projects would be minor and potentially offset by beneficial effects from demolition projects and removal of impervious surface area. Proposed Action would not induce further degradation of water quality. Effect not significant.

Resource	Past Actions	Current Background Activities	Proposed Action	Known Future Actions	Cumulative Effects
Biological Resources	Degraded habitat of sensitive and common wildlife species. No Federal-listed species or significant habitat present. Occasional use by state-listed species, species of concern, and migratory birds.	Presence and operation of facilities impact wildlife and their habitat, state-listed species, species of concern, and migratory birds.	Minor disturbance of vegetation and habitat from construction and demolition. Direct and indirect, minor adverse effects on wetlands. No significant habitat for threatened and endangered species. Minor disturbance of occasional-use habitat from construction and demolition.	Continued development of area could impact vegetation communities, wildlife habitat, and wetlands. Continued development of area could have minor effects on state-listed species, species of concern, migratory birds, and their occasional-use habitat.	Direct, minor effects from the permanent loss of vegetation, habitat, and wetlands. Indirect, minor effects on wetlands from excavation. Permanent loss of occasional-use habitat by threatened and endangered species would be minimized through continued natural resources management. Effect not significant.
Cultural Resources	No eligible archaeological sites. Possible destruction of eligible buildings. Unknown impacts on traditional cultural properties.	Potentially eligible buildings are maintained as if they are eligible for the NRHP.	Demolition of Buildings 714, 703, 704, 705, 706, and 707. Construction and demolition projects potentially affecting cultural resources coordinated with the SHPO, FUB, and 319 CES/CEA.	General development might have effects on viewsheds and historic buildings.	There is a potential for long-term, direct, minor, adverse effects on cultural resources. Demolition of potentially eligible historic buildings would cause permanent effects.
Socioeconomics and Environmental Justice	Grand Forks AFB contributes to the local economic community.	Continued support of local economic community.	Minor to moderate contribution to local construction industry.	Continued development could impact local economy and services.	Minor stimulation of local economic community in context of increased level of service support.

Resource	Past Actions	Current Background Activities	Proposed Action	Known Future Actions	Cumulative Effects
Infrastructure	Infrastructure developed to support current mission activities.	Grand Forks AFB continues to improve utility and infrastructure system.	New development, renovation of aged facilities and infrastructure, and increased usage of utilities and infrastructure.	Infrastructure, and utility improvements on the installation.	Construction of new facilities and renovation of aged facilities would have a major effect on some aspects of infrastructure and a corresponding need to upgrade utilities and infrastructure further.
Hazardous Materials and Wastes	Seven ERP sites and one land treatment facility have been identified.	Grand Forks AFB monitors and manages ERP sites. Hazardous materials and wastes managed according to appropriate regulations and management plans.	Small quantities of materials used and wastes generated during projects. Potential for workers to encounter hazardous materials and wastes within ERP sites.	Development and growth of industrial uses could increase hazardous material use and waste generated, but not to levels that cannot be managed by current practices.	Construction and demolition activities would have a minor effect on hazardous materials and wastes. Effect not significant. Potential for long-term, beneficial effects from further cleanup of ERP sites.
Safety	Past renovation, demolition, and construction activities have resulted in short-term construction safety risks.	Non-airfield development constrained in CZs, APZs, and imaginary surfaces. QD arcs constrained for safety reasons.	Short-term effects from construction safety risks during renovation, demolition, and new construction.	Continued renovation, demolition, and construction could cause temporary safety risks.	Construction safety risks would cease beyond completion of the demolition and construction components of the Proposed Action. No long-term or significant effects.

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Construction impacts are short-term environmental effects resulting from the process of building the Proposed Action. Construction impacts might involve temporary changes in noise levels, air quality, water quality, land use, and community access.

5.5 Unavoidable Adverse Impacts

Unavoidable adverse impacts would result from the implementation of the Proposed Action. None of these impacts would be significant.

Hazardous Materials and Waste. The generation of hazardous materials and wastes is an unavoidable condition associated with the Proposed Action. However, the potential for this would not significantly increase over baseline conditions and, therefore, is not considered significant.

Energy Resources. The use of nonrenewable resources is an unavoidable occurrence, although not considered significant. The Proposed Action would require the use of fossil fuels, a nonrenewable natural resource. Energy supplies, although relatively small, would be committed to the Proposed Action or No Action Alternative.

Wetlands. Minor, direct, adverse effects would be expected on wetlands and other jurisdictional waters of the United States from implementing the Proposed Action. Direct effects would be reduced to the maximum extent possible through design and implementation of environmental protection measures and BMPs as outlined in **Appendix G**, and Grand Forks AFB would obtain CWA Section 404 and 401 permits, as required. Reasonable alternatives were considered for each of the two proposed projects with direct impacts on wetlands and waters of the United States (Construct Base Civil Engineering Pavements and Maintenance Facility/Snow Barn [Project C2] and Construct Indoor Small Arms Range [Project C3]), but no other alternatives to these proposed projects met the safety or operational requirements of the 319 ARW (see **Sections 4.4.2.2 and 4.4.2.3**).

5.6 Compatibility of the Proposed Action and Alternatives with the Objectives of Federal, Regional, State, and Local Land Use Plans, Policies, and Controls

Impacts on the ground surface as a result of the Proposed Action would occur entirely within the boundaries of Grand Forks AFB. Construction activities would not result in any significant or incompatible land use changes on- or off-installation. The projects under the Proposed Action would be at locations consistent with current and future land use zones. Consequently, construction activities would not be in conflict with future installation land use policies or objectives. The Proposed Action would not conflict with any applicable off-installation land use ordinances or designated clear zones.

5.7 Relationship Between the Short-term Use of the Environment and Long-term Productivity

Short-term uses of the biophysical components of human environment include direct construction-related disturbances and direct impacts associated with an increase in population and activity that occurs over a period of less than 5 years. Long-term uses of the human environment include those impacts occurring over a period of more than 5 years, including permanent resource loss.

Several kinds of activities could result in short-term resource uses that compromise long-term productivity. Filling of wetlands or loss of other especially important habitats and consumptive use of high-quality water at nonrenewable rates are examples of actions that affect long-term productivity.

The Proposed Action would not result in an intensification of land use at Grand Forks AFB and in the surrounding area. Development of the Proposed Action would not represent a significant loss of open space. Therefore, it is anticipated that the Proposed Action would not result in any cumulative land use or aesthetic impacts. Long-term productivity of these sites would be increased by the implementation of the Proposed Action.

5.8 Irreversible and Irretrievable Commitments of Resources

The irreversible environmental changes that would result from implementation of the Proposed Action involve the consumption of material resources, energy resources, land, biological habitat, human resources, and wetlands. The use of these resources is considered to be permanent.

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that use of these resources would have on future generations. Irreversible effects primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable timeframe (e.g., energy and minerals).

Material Resources. Material resources used for the Proposed Action and alternatives include building materials (for renovation or construction of facilities), concrete and asphalt (for parking lots and roads), and various material supplies (for infrastructure) and would be irreversibly lost. Most of the materials that would be consumed are not in short supply, would not limit other unrelated construction activities, and would not be considered significant.

Energy Resources. No significant impacts would be expected on energy resources used as a result of the Proposed Action, though any energy resources consumed would be irretrievably lost. These include petroleum-based products (e.g., gasoline and diesel), natural gas, and electricity. During construction, gasoline and diesel would be used for the operation of construction vehicles. During operation, gasoline or diesel would be used for the operation of privately owned and government-owned vehicles. Natural gas and electricity would be used by operational activities. Consumption of these energy resources would not place a significant demand on their availability in the region.

Biological Habitat. The Proposed Action would result in the loss of some vegetation and wildlife habitat at the proposed construction areas.

Human Resources. The use of human resources for construction and operation is considered an irretrievable loss, but only in that it would preclude such personnel from engaging in other work activities. However, the use of human resources for the Proposed Action and alternatives represent employment opportunities, and is considered beneficial.

Wetlands. The Proposed Action would result in a local reduction in soil permeability and groundwater recharge rates as a result of soil compaction. However, this would be considered negligible when compared with the total recharge area available. Two of the proposed projects at Grand Forks AFB have potential to have minor, direct, adverse impacts on wetlands or other jurisdictional waters of the United States (e.g., dredging or placement of fill). These projects are Construct BCE Pavements and Maintenance Facility/Snow Barn (Project C1) and Construct Indoor Small Arms Range (Project C3) (see **Figure 2-1**). These projects would directly result in minor losses to wetlands and jurisdictional waters of the United States, but these losses compared to the overall acreages of wetlands and jurisdictional waters of the United States would be negligible.

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APPENDIX A

APPLICABLE LAWS, REGULATIONS, POLICIES, AND PLANNING CRITERIA

Appendix A

Applicable Laws, Regulations, Policies, and Planning Criteria

When considering the affected environment, the various physical, biological, economic, and social environmental factors must be considered. In addition to the National Environmental Policy Act (NEPA), there are other environmental laws as well as Executive Orders (EOs) to be considered when preparing environmental analyses. These laws are summarized below.

NOTE: This is not a complete list of all applicable laws, regulations, policies, and planning criteria potentially applicable to documents, however, it does provide a general summary for use as a reference.

Airspace

Airspace management procedures assist in preventing potential conflicts or accidents associated with aircraft using designated airspace in the United States, including restricted military airspace. Airspace management involves the coordination, integration, and regulation of the use of airspace. The Federal Aviation Administration (FAA) has overall responsibility for managing airspace through a system of flight rules and regulations, airspace management actions, and air traffic control (ATC) procedures. All military and civilian aircraft are subject to Federal Aviation Regulations (FARs). The FAA's *Aeronautical Information Manual* defines the operational requirements for each of the various types or classes of military and civilian airspace.

Some military services have specific guidance for airspace management. For example, airspace management in the U.S. Air Force (USAF) is guided by Air Force Instruction (AFI) 13-201, *Air Force Airspace Management*. This AFI provides guidance and procedures for developing and processing special use airspace (SUA). It covers aeronautical matters governing the efficient planning, acquisition, use, and management of airspace required to support USAF flight operations. It applies to activities that have operational or administrative responsibility for using airspace, establishes practices to decrease disturbances from flight operations that might cause adverse public reaction, and provides flying unit commanders with general guidance for dealing with local problems. The U.S. Army, per Army Regulation (AR) 95-2, *Airspace, Airfields/Heliport, Flight Activities, Air Traffic Control and Navigational Aids*, provides similar guidance and procedures for U.S. Army airspace operations.

Noise

Federal and local governments have established noise guidelines and regulations for the purpose of protecting citizens from potential hearing damage and from various other adverse physiological, psychological, and social effects associated with noise. The U.S. Department of Housing and Urban Development (HUD), in coordination with the Department of Defense (DOD) and the FAA, has established criteria for acceptable noise levels for aircraft operations relative to various types of land use.

The U.S. Army, through AR 200-1, *Environmental Protection and Enhancement*, implements Federal laws concerning environmental noise from U.S. Army activities. The USAF's Air Installation Compatible Use Zone (AICUZ) Program, (AFI 32-7063), provides guidance to air bases and local communities in planning land uses compatible with airfield operations. The AICUZ program describes existing aircraft noise and flight safety zones on and near USAF installations.

Land Use

The term “land use” refers to real property classifications that indicate either natural conditions or the types of human activities occurring on a defined parcel of land. In many cases, land use descriptions are codified in local zoning laws. However, there is no nationally recognized convention or uniform terminology for describing land use categories.

Land use planning in the USAF is guided by *Land Use Planning Bulletin, Base Comprehensive Planning* (HQ USAF/LEEVX, August 1, 1986). This document provides for the use of 12 basic land use types found on a USAF installation. In addition, land use guidelines established by the HUD and based on findings of the Federal Interagency Committee on Noise (FICON) are used to recommend acceptable levels of noise exposure for land use. The U.S. Army uses the 12 land use types for installation land use planning, and these land use types roughly parallel those employed by municipalities in the civilian sector.

Air Quality

The Clean Air Act (CAA) of 1970, and Amendments of 1977 and 1990, recognizes that increases in air pollution result in danger to public health and welfare. To protect and enhance the quality of the Nation’s air resources, the CAA authorizes the U.S. Environmental Protection Agency (USEPA) to set six National Ambient Air Quality Standards (NAAQS) which regulate carbon monoxide, lead, nitrogen dioxide, ozone, sulfur dioxide, and particulate matter pollution emissions. The CAA seeks to reduce or eliminate the creation of pollutants at their source, and designates this responsibility to state and local governments. States are directed to utilize financial and technical assistance and leadership from the Federal government to develop implementation plans to achieve NAAQS. Geographic areas are officially designated by the USEPA as being in attainment or nonattainment for pollutants in relation to their compliance with NAAQS. Geographic regions established for air quality planning purposes are designated as Air Quality Control Regions (AQCRs). Pollutant concentration levels are measured at designated monitoring stations within the AQCR. An area with insufficient monitoring data is designated as unclassified. Section 309 of the CAA authorizes USEPA to review and comment on impact statements prepared by other agencies.

An agency should consider what effect an action might have on NAAQS due to short-term increases in air pollution during construction and long-term increases resulting from changes in traffic patterns. For actions in attainment areas, a Federal agency could also be subject to USEPA’s Prevention of Significant Deterioration (PSD) regulations. These regulations apply to new major stationary sources and modifications to such sources. Although few agency facilities will actually emit pollutants, increases in pollution can result from a change in traffic patterns or volume. Section 118 of the CAA waives Federal immunity from complying with the CAA and states all Federal agencies will comply with all Federal- and state-approved requirements.

The General Conformity Rule requires that any Federal action meet the requirements of a State Implementation Plan (SIP) or Federal Implementation Plan. More specifically, CAA conformity is ensured when a Federal action does not cause a new violation of the NAAQS; contribute to an increase in the frequency or severity of violations of NAAQS; or delay the timely attainment of any NAAQS, interim progress milestones, or other milestones toward achieving compliance with the NAAQS.

The General Conformity Rule applies only to actions in nonattainment or maintenance areas and considers both direct and indirect emissions. The rule applies only to Federal actions that are considered “regionally significant” or where the total emissions from the action meet or exceed the *de minimis* thresholds presented in 40 CFR 93.153. An action is regionally significant when the total nonattainment

pollutant emissions exceed 10 percent of the AQCR's total emissions inventory for that nonattainment pollutant. If a Federal action does not meet or exceed the *de minimis* thresholds and is not considered regionally significant, then a full Conformity Determination is not required.

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (October 5, 2009) established an integrated strategy towards sustainability in Federal Government and to make reduction of greenhouse gas emissions a priority for the Federal agencies. Federal agencies are required to increase energy efficiency; measure, report, and reduce their greenhouse gas emissions; conserve and protect water resources through efficiency, reuse, and storm water management; and eliminate waste, recycle, and prevent pollution. This EO requires all Federal agencies to establish and report a percentage reduction target for agencywide reductions of scope 1 to 3 greenhouse gas emissions by fiscal year 2020, using fiscal year 2008 as the baseline year. Each agency shall consider reductions associated with reducing energy intensity in agency buildings; increasing agency use of renewable energy and implementing renewable energy generation projects on agency property; and reducing the use of fossil fuels by using low greenhouse gas emitting vehicles including alternative fuel vehicles; optimizing the number of vehicles in the agency fleet; and reducing, if the agency operates a fleet of at least 20 motor vehicles, the agency fleet's total consumption of petroleum products by a minimum of 2 percent annually through the end of fiscal year 2020, relative to a baseline of fiscal year 2005.

Health and Safety

Human health and safety relates to workers' health and safety during demolition or construction of facilities, or applies to work conditions during operations of a facility that could expose workers to conditions that pose a health or safety risk. The Federal Occupational Safety and Health Administration (OSHA) issues standards to protect persons from such risks, and the DOD and state and local jurisdictions issue guidance to comply with these OSHA standards. Safety also can refer to safe operations of aircraft or other equipment.

AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program*, implements Air Force Policy Directive (AFPD) 91-3, *Occupational Safety and Health*, by outlining the AFOSH Program. The purpose of the AFOSH Program is to minimize loss of USAF resources and to protect USAF personnel from occupational deaths, injuries, or illnesses by managing risks. In conjunction with the USAF Mishap Prevention Program, these standards ensure all USAF workplaces meet Federal safety and health requirements.

AFI 91-202, *USAF Mishap Prevention Program*, implements AFPD 91-2, *Safety Programs*. It establishes mishap prevention program requirements (including the Bird/Wildlife Aircraft Strike Hazard [BASH] Program), assigns responsibilities for program elements, and contains program management information.

U.S. Army regulations in AR 385-10, *Army Safety Program*, prescribe policy, responsibilities, and procedures to protect and preserve U.S. Army personnel and property from accidental loss or injury. AR 40-5, *Preventive Medicine*, provides for the promotion of health and the prevention of disease and injury.

Geological Resources

Recognizing that millions of acres per year of prime farmland are lost to development, Congress passed the Farmland Protection Policy Act to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland (7 Code of Federal Regulations [CFR] Part 658). Prime farmland is described as soils that have a combination of soil and landscape properties that make

them highly suitable for cropland, such as high inherent fertility, good water-holding capacity, and deep or thick effective rooting zones, and that are not subject to periodic flooding. Under the Farmland Protection Policy Act, agencies are encouraged to conserve prime or unique farmlands when alternatives are practicable. Some activities that are not subject to the Farmland Protection Policy Act include Federal permitting and licensing, projects on land already in urban development or used for water storage, construction for national defense purposes, or construction of new minor secondary structures such as a garage or storage shed.

Water Resources

The Clean Water Act (CWA) of 1977 is an amendment to the Federal Water Pollution Control Act of 1972, is administered by USEPA, and sets the basic structure for regulating discharges of pollutants into U.S. waters. The CWA requires USEPA to establish water quality standards for specified contaminants in surface waters and forbids the discharge of pollutants from a point source into navigable waters without a National Pollutant Discharge Elimination System (NPDES) permit. NPDES permits are issued by USEPA or the appropriate state if it has assumed responsibility. Section 404 of the CWA establishes a Federal program to regulate the discharge of dredge and fill material into waters of the United States. Section 404 permits are issued by the U.S. Army Corps of Engineers (USACE). Waters of the United States include interstate and intrastate lakes, rivers, streams, and wetlands that are used for commerce, recreation, industry, sources of fish, and other purposes. The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Each agency should consider the impact on water quality from actions such as the discharge of dredge or fill material into U.S. waters from construction, or the discharge of pollutants as a result of facility occupation.

Section 303(d) of the CWA requires states and USEPA to identify waters not meeting state water quality standards and to develop Total Maximum Daily Loads (TMDLs). A TMDL is the maximum amount of a pollutant that a waterbody can receive and still be in compliance with state water quality standards. After determining TMDLs for impaired waters, states are required to identify all point and nonpoint sources of pollution in a watershed that are contributing to the impairment and to develop an implementation plan that will allocate reductions to each source to meet the state standards. The TMDL program is currently the Nation's most comprehensive attempt to restore and improve water quality. The TMDL program does not explicitly require the protection of riparian areas. However, implementation of the TMDL plans typically calls for restoration of riparian areas as one of the required management measures for achieving reductions in nonpoint source pollutant loadings.

The USEPA issued a Final Rule for the CWA concerning technology-based Effluent Limitations Guidelines and New Source Performance Standards for the Construction and Development point source category. All NPDES storm water permits issued by the USEPA or states must incorporate requirements established in the Final Rule. As of February 1, 2010, all new construction sites are required to meet the non-numeric effluent limitations and design, install, and maintain effective erosion and sedimentation controls. In addition, construction site owners and operators that disturb 1 or more acres of land are required to use best management practices (BMPs) to ensure that soil disturbed during construction activities does not pollute nearby water bodies. Effective August 1, 2011, construction activities disturbing 20 or more acres must comply with the numeric effluent limitation for turbidity in addition to the non-numeric effluent limitations. The maximum daily turbidity limitation is 280 nephelometric turbidity units (ntu). On February 2, 2014, construction site owners and operators that disturb 10 or more acres of land are required to monitor discharges to ensure compliance with effluent limitations as specified by the permitting authority. Construction site owners are encouraged to phase ground-disturbing activities to limit the applicability of the monitoring requirements and the turbidity limitation. The USEPA's limitations are based on its assessment of what specific technologies can reliably achieve.

Permittees can select management practices or technologies that are best suited for site-specific conditions.

The Coastal Zone Management Act (CZMA) of 1972 declares a national policy to preserve, protect, and develop, and, where possible, restore or enhance the resources of the Nation's coastal zone. The coastal zone refers to the coastal waters and the adjacent shorelines, including islands, transitional and intertidal areas, salt marshes, wetlands, and beaches, and includes the Great Lakes. The CZMA encourages states to exercise their full authority over the coastal zone through the development of land and water use programs in cooperation with Federal and local governments. States may apply for grants to help develop and implement management programs to achieve wise use of the land and water resources of the coastal zone. Development projects affecting land or water use or natural resources of a coastal zone must ensure the project is, to the maximum extent practicable, consistent with the state's coastal zone management program.

The Safe Drinking Water Act (SDWA) of 1974 establishes a Federal program to monitor and increase the safety of all commercially and publicly supplied drinking water. Congress amended the SDWA in 1986, mandating dramatic changes in nationwide safeguards for drinking water and establishing new Federal enforcement responsibility on the part of USEPA. The 1986 amendments to the SDWA require USEPA to establish Maximum Contaminant Levels (MCLs), Maximum Contaminant Level Goals (MCLGs), and Best Available Technology (BAT) treatment techniques for organic, inorganic, radioactive, and microbial contaminants; and turbidity. MCLGs are maximum concentrations below which no negative human health effects are known to exist. The 1996 amendments set current Federal MCLs, MCLGs, and BATs for organic, inorganic, microbiological, and radiological contaminants in public drinking water supplies.

The Wild and Scenic Rivers Act of 1968 provides for a wild and scenic river system by recognizing the remarkable values of specific rivers of the Nation. These selected rivers and their immediate environment are preserved in a free-flowing condition, without dams or other construction. The policy not only protects the water quality of the selected rivers but also provides for the enjoyment of present and future generations. Any river in a free-flowing condition is eligible for inclusion, and can be authorized as such by an Act of Congress, an act of state legislature, or by the Secretary of the Interior upon the recommendation of the governor of the state(s) through which the river flows.

EO 11988, *Floodplain Management* (May 24, 1977), directs agencies to consider alternatives to avoid adverse effects and incompatible development in floodplains. An agency may locate a facility in a floodplain if the head of the agency finds there is no practicable alternative. If it is found there is no practicable alternative, the agency must minimize potential harm to the floodplain, and circulate a notice explaining why the action is to be located in the floodplain prior to taking action. Finally, new construction in a floodplain must apply accepted floodproofing and flood protection to include elevating structures above the base flood level rather than filling in land.

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (October 5, 2009), directed the USEPA to issue guidance on Section 438 of the Energy Independence and Security Act (EISA). The EISA establishes into law new storm water design requirements for Federal construction projects that disturb a footprint of greater than 5,000 square feet of land. Under these requirements, predevelopment site hydrology must be maintained or restored to the maximum extent technically feasible with respect to temperature, rate, volume, and duration of flow. Predevelopment hydrology would be calculated and site design would incorporate storm water retention and reuse technologies to the maximum extent technically feasible. Post-construction analyses will be conducted to evaluate the effectiveness of the as-built storm water reduction features. These regulations are applicable to DOD Unified Facilities Criteria. Additional guidance is provided in the USEPA's *Technical Guidance on*

Biological Resources

The Endangered Species Act (ESA) of 1973 establishes a Federal program to conserve, protect, and restore threatened and endangered plants and animals and their habitats. The ESA specifically charges Federal agencies with the responsibility of using their authority to conserve threatened and endangered species. All Federal agencies must ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of an endangered or threatened species or result in the destruction of critical habitat for these species, unless the agency has been granted an exemption. The Secretary of the Interior, using the best available scientific data, determines which species are officially endangered or threatened, and the U.S. Fish and Wildlife Service (USFWS) maintains the list. A list of Federal endangered species can be obtained from the Endangered Species Division, USFWS (703-358-2171). States might also have their own lists of threatened and endangered species which can be obtained by calling the appropriate State Fish and Wildlife office. Some species also have laws specifically for their protection (e.g., Bald Eagle Protection Act).

The Migratory Bird Treaty Act (MBTA) of 1918, as amended, implements treaties and conventions between the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Unless otherwise permitted by regulations, the MBTA makes it unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess; offer to or sell, barter, purchase, or deliver; or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg, or product, manufactured or not. The MBTA also makes it unlawful to ship, transport, or carry from one state, territory, or district to another; or through a foreign country, any bird, part, nest, or egg that was captured, killed, taken, shipped, transported, or carried contrary to the laws from where it was obtained; and import from Canada any bird, part, nest, or egg obtained contrary to the laws of the province from which it was obtained. The U.S. Department of the Interior has authority to arrest, with or without a warrant, a person violating the MBTA.

EO 11514, *Protection and Enhancement of Environmental Quality* (March 5, 1970), states that the President, with assistance from the Council on Environmental Quality (CEQ), will lead a national effort to provide leadership in protecting and enhancing the environment for the purpose of sustaining and enriching human life. Federal agencies are directed to meet national environmental goals through their policies, programs, and plans. Agencies should also continually monitor and evaluate their activities to protect and enhance the quality of the environment. Consistent with NEPA, agencies are directed to share information about existing or potential environmental problems with all interested parties, including the public, in order to obtain their views.

EO 11990, *Protection of Wetlands* (May 24, 1977), directs agencies to consider alternatives to avoid adverse effects and incompatible development in wetlands. Federal agencies are to avoid new construction in wetlands, unless the agency finds there is no practicable alternative to construction in the wetland, and the proposed construction incorporates all possible measures to limit harm to the wetland. Agencies should use economic and environmental data, agency mission statements, and any other pertinent information when deciding whether or not to build in wetlands. EO 11990 directs each agency to provide for early public review of plans for construction in wetlands.

EO 13186, *Conservation of Migratory Birds* (January 10, 2001), creates a more comprehensive strategy for the conservation of migratory birds by the Federal government. EO 13186 provides a specific framework for the Federal government's compliance with its treaty obligations to Canada, Mexico, Russia, and Japan. EO 13186 provides broad guidelines on conservation responsibilities and requires the

development of more detailed guidance in a Memorandum of Understanding (MOU). EO 13186 will be coordinated and implemented by the USFWS. The MOU will outline how Federal agencies will promote conservation of migratory birds. EO 13186 requires the support of various conservation planning efforts already in progress; incorporation of bird conservation considerations into agency planning, including NEPA analyses; and reporting annually on the level of take of migratory birds. The Federal Noxious Weed Act (Public Law 93-629) of 1975, as amended in 1990, established a Federal program to control the spread of noxious weeds. The Secretary of Agriculture was given the authority to designate plants as noxious weeds by regulation and the movement of such weeds in interstate or foreign commerce was prohibited except under permit. The Secretary was also given authority to inspect, seize, and destroy products and quarantine areas, if necessary, to prevent the spread of such weeds. The Secretary was also authorized to cooperate with Federal, state, and local agencies; farmer associations, and private individuals in measures to control, eradicate, prevent, or retard the spread of noxious weeds. This law also requires that any environmental assessments or impact statements that are required to implement plant control agreements must be completed within 1 year of the time the need for the document is established.

EO 13112, *Invasive Species* (February 3, 1999), provides direction to use relevant programs and authorities to prevent introduction of invasive species, detect and respond rapidly to control populations of invasive species, monitor invasive species populations, provide restoration of native species and habitat conditions in ecosystems that have been invaded, conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species, and promote public education on invasive species with means to address them. EO 13112 was created to minimize the economic, ecological, and human health impacts that invasive species cause.

Cultural Resources

The American Indian Religious Freedom Act of 1978 and Amendments of 1994 recognize that freedom of religion for all people is an inherent right, and traditional American Indian religions are an indispensable and irreplaceable part of Indian life. It also recognized the lack of Federal policy on this issue and made it the policy of the United States to protect and preserve the inherent right of religious freedom for Native Americans. The 1994 Amendments provide clear legal protection for the religious use of peyote cactus as a religious sacrament. Federal agencies are responsible for evaluating their actions and policies to determine if changes should be made to protect and preserve the religious cultural rights and practices of Native Americans. These evaluations must be made in consultation with native traditional religious leaders.

The Archaeological Resource Protection Act (ARPA) of 1979 protects archaeological resources on public and American Indian lands. It provides felony-level penalties for the unauthorized excavation, removal, damage, alteration, or defacement of any archaeological resource, defined as material remains of past human life or activities which are at least 100 years old. Before archaeological resources are excavated or removed from public lands, the Federal land manager must issue a permit detailing the time, scope, location, and specific purpose of the proposed work. ARPA also fosters the exchange of information about archaeological resources between governmental agencies, the professional archaeological community, and private individuals. ARPA is implemented by regulations found in 43 CFR Part 7.

The National Historic Preservation Act (NHPA) of 1966 sets forth national policy to identify and preserve properties of state, local, and national significance. The NHPA establishes the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers (SHPOs), and the National Register of Historic Places (NRHP). The ACHP advises the President, Congress, and Federal agencies on historic preservation issues. Section 106 of the NHPA directs Federal agencies to take into account effects of their undertakings (actions and authorizations) on properties included in or eligible for the NRHP.

Section 110 sets inventory, nomination, protection, and preservation responsibilities for federally owned cultural properties. Section 106 of the act is implemented by regulations of the ACHP, 36 CFR Part 800. Agencies should coordinate studies and documents prepared under Section 106 with NEPA where appropriate. However, NEPA and NHPA are separate statutes and compliance with one does not constitute compliance with the other. For example, actions which qualify for a categorical exclusion under NEPA might still require Section 106 review under NHPA. It is the responsibility of the agency official to identify properties in the area of potential effects, and whether they are included or eligible for inclusion in the NRHP. Section 110 of the NHPA requires Federal agencies to identify, evaluate, and nominate historic property under agency control to the NRHP.

The Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 establishes rights of American Indian tribes to claim ownership of certain “cultural items,” defined as Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony, held or controlled by Federal agencies. Cultural items discovered on Federal or tribal lands are, in order of primacy, the property of lineal descendants, if these can be determined, and then the tribe owning the land where the items were discovered or the tribe with the closest cultural affiliation with the items. Discoveries of cultural items on Federal or tribal land must be reported to the appropriate American Indian tribe and the Federal agency with jurisdiction over the land. If the discovery is made as a result of a land use, activity in the area must stop and the items must be protected pending the outcome of consultation with the affiliated tribe.

EO 11593, *Protection and Enhancement of the Cultural Environment* (May 13, 1971), directs the Federal government to provide leadership in the preservation, restoration, and maintenance of the historic and cultural environment. Federal agencies are required to locate and evaluate all Federal sites under their jurisdiction or control which might qualify for listing on the NRHP. Agencies must allow the ACHP to comment on the alteration, demolition, sale, or transfer of property which is likely to meet the criteria for listing as determined by the Secretary of the Interior in consultation with the SHPO. Agencies must also initiate procedures to maintain federally owned sites listed on the NRHP.

EO 13007, *Indian Sacred Sites* (May 24, 1996), provides that agencies managing Federal lands, to the extent practicable, permitted by law, and not inconsistent with agency functions, shall accommodate American Indian religious practitioners’ access to and ceremonial use of American Indian sacred sites, shall avoid adversely affecting the physical integrity of such sites, and shall maintain the confidentiality of such sites. Federal agencies are responsible for informing tribes of proposed actions that could restrict future access to or ceremonial use of, or adversely affect the physical integrity of, sacred sites.

EO 13175, *Consultation and Coordination with Indian Tribal Governments* (November 6, 2000), was issued to provide for regular and meaningful consultation and collaboration with Native American tribal officials in the development of Federal policies that have tribal implications, and to strengthen the United States government-to-government relationships with Native American tribes. EO 13175 recognizes the following fundamental principles: Native American tribes exercise inherent sovereignty over their lands and members, the United States government has a unique trust relationship with Native American tribes and deals with them on a government-to-government basis, and Native American tribes have the right to self-government and self-determination.

EO 13287, *Preserve America* (March 3, 2003), orders Federal agencies to take a leadership role in protection, enhancement, and contemporary use of historic properties owned by the Federal government, and promote intergovernmental cooperation and partnerships for preservation and use of historic properties. EO 13287 established new accountability for agencies with respect to inventories and stewardship.

Socioeconomics and Environmental Justice

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994), directs Federal agencies to make achieving environmental justice part of their mission. Agencies must identify and address the adverse human health or environmental effects that its activities have on minority and low-income populations, and develop agencywide environmental justice strategies. The strategy must list “programs, policies, planning and public participation processes, enforcement, and/or rulemakings related to human health or the environment that should be revised to promote enforcement of all health and environmental statutes in areas with minority populations and low-income populations, ensure greater public participation, improve research and data collection relating to the health of and environment of minority populations and low-income populations, and identify differential patterns of consumption of natural resources among minority populations and low-income populations.” A copy of the strategy and progress reports must be provided to the Federal Working Group on Environmental Justice. Responsibility for compliance with EO 12898 is with each Federal agency.

Hazardous Materials and Waste

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 authorizes USEPA to respond to spills and other releases of hazardous substances to the environment, and authorizes the National Oil and Hazardous Substances Pollution Contingency Plan. CERCLA also provides a Federal “Superfund” to respond to emergencies immediately. Although the “Superfund” provides funds for cleanup of sites where potentially responsible parties cannot be identified, USEPA is authorized to recover funds through damages collected from responsible parties. This funding process places the economic burden for cleanup on polluters.

The Pollution Prevention Act (PPA) of 1990 encourages manufacturers to avoid the generation of pollution by modifying equipment and processes; redesigning products; substituting raw materials; and making improvements in management techniques, training, and inventory control. Consistent with pollution prevention principles, EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management* (January 24, 2007 [revoking EO 13148]), sets a goal for all Federal agencies to promote environmental practices, including acquisition of biobased, environmentally preferable, energy-efficient, water-efficient, and recycled-content products; and use of paper of at least 30 percent post-consumer fiber content. In addition, EO 13423 sets a goal that requires Federal agencies to ensure that they reduce the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of; increase diversion of solid waste, as appropriate; and maintain cost-effective waste prevention and recycling programs at their facilities. Additionally, in *Federal Register* Volume 58 Number 18 (January 29, 1993), CEQ provides guidance to Federal agencies on how to “incorporate pollution prevention principles, techniques, and mechanisms into their planning and decisionmaking processes and to evaluate and report those efforts, as appropriate, in documents pursuant to NEPA.”

The Resource Conservation and Recovery Act (RCRA) of 1976 is an amendment to the Solid Waste Disposal Act. RCRA authorizes USEPA to provide for “cradle-to-grave” management of hazardous waste and sets a framework for the management of nonhazardous municipal solid waste. Under RCRA, hazardous waste is controlled from generation to disposal through tracking and permitting systems, and restrictions and controls on the placement of waste on or into the land. Under RCRA, a waste is defined as hazardous if it is ignitable, corrosive, reactive, toxic, or listed by USEPA as being hazardous. With the Hazardous and Solid Waste Amendments (HSWA) of 1984, Congress targeted stricter standards for waste disposal and encouraged pollution prevention by prohibiting the land disposal of particular wastes. The HSWA amendments strengthen control of both hazardous and nonhazardous waste and emphasize the prevention of pollution of groundwater.

The Superfund Amendments and Reauthorization Act (SARA) of 1986 mandates strong clean-up standards and authorizes USEPA to use a variety of incentives to encourage settlements. Title III of SARA authorizes the Emergency Planning and Community Right to Know Act (EPCRA), which requires facility operators with “hazardous substances” or “extremely hazardous substances” to prepare comprehensive emergency plans and to report accidental releases. If a Federal agency acquires a contaminated site, it can be held liable for cleanup as the property owner/operator. A Federal agency can also incur liability if it leases a property, as the courts have found lessees liable as “owners.” However, if the agency exercises due diligence by conducting a Phase I Environmental Site Assessment, it can claim the “innocent purchaser” defense under CERCLA. According to Title 42 United States Code (U.S.C.) 9601(35), the current owner/operator must show it undertook “all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice” before buying the property to use this defense.

The Toxic Substance Control Act (TSCA) of 1976 consists of four titles. Title I established requirements and authorities to identify and control toxic chemical hazards to human health and the environment. TSCA authorized USEPA to gather information on chemical risks, require companies to test chemicals for toxic effects, and regulate chemicals with unreasonable risk. TSCA also singled out polychlorinated biphenyls (PCBs) for regulation, and, as a result, PCBs are being phased out. PCBs are persistent when released into the environment and accumulate in the tissues of living organisms. They have been shown to cause adverse health effects on laboratory animals and could cause adverse health effects in humans. TSCA and its regulations govern the manufacture, processing, distribution, use, marking, storage, disposal, clean-up, and release reporting requirements for numerous chemicals like PCBs. TSCA Title II provides statutory framework for “Asbestos Hazard Emergency Response,” which applies only to schools. TSCA Title III, “Indoor Radon Abatement,” states indoor air in buildings of the United States should be as free of radon as the outside ambient air. Federal agencies are required to conduct studies on the extent of radon contamination in buildings they own. TSCA Title IV, “Lead Exposure Reduction,” directs Federal agencies to “conduct a comprehensive program to promote safe, effective, and affordable monitoring, detection, and abatement of lead-based paint and other lead exposure hazards.” Further, any Federal agency having jurisdiction over a property or facility must comply with all Federal, state, interstate, and local requirements concerning lead-based paint.

Energy

EO 13514, *Federal Leadership In Environmental, Energy, And Economic Performance*, dated October 5, 2009, directs Federal agencies to improve water use efficiency and management; implement high performance sustainable Federal building design, construction, operation and management; and advance regional and local integrated planning by identifying and analyzing impacts from energy usage and alternative energy sources. EO 13514 also directs Federal agencies to prepare and implement a Strategic Sustainability Performance Plan to manage its greenhouse gas emissions, water use, pollution prevention, regional development and transportation planning, sustainable building design and promote sustainability in its acquisition of goods and services. Section 2(g) requires new construction, major renovation, or repair and alteration of buildings to comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings*. The CEQ regulations at 40 CFR 1502.16(e) directs agencies to consider the energy requirements and conservation potential of various alternatives and mitigation measures.

Section 503(b) of Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, instructs Federal agencies to conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically, and fiscally sound, integrated, continuously improving, efficient, and sustainable manner. EO 13423 sets goals in energy efficiency, acquisition, renewable energy, toxic chemical reduction,

recycling, sustainable buildings, electronics stewardship, fleets, and water conservation. Sustainable design measures such as the use of “green” technology (e.g., photovoltaic panels, solar collection, heat recovery systems, wind turbines, green roofs, and habitat-oriented storm water management) would be incorporated where practicable.

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APPENDIX B

INTERAGENCY AND INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING CORRESPONDENCE



DEPARTMENT OF THE AIR FORCE
319TH CIVIL ENGINEER SQUADRON
525 TUSKEGEE AIRMEN BLVD
GRAND FORKS AIR FORCE BASE, NORTH DAKOTA

MAY 17 2010

MEMORANDUM FOR DISTRIBUTION


FROM: 319 CES/CC
525 Tuskegee Airmen Blvd
Grand Forks AFB ND 58205-6434

SUBJECT: Draft Environmental Assessment of Installation Development at Grand Forks Air Force Base (AFB), North Dakota and Finding of No Significant Impact (FONSI)/Finding of No Practicable Alternative (FONPA)

The 319th Air Refueling Wing (319 ARW) at Grand Forks AFB, North Dakota and Headquarters Air Mobility Command (AMC) are preparing the Environmental Assessment (EA) for Installation Development as a comprehensive document to improve installation planning and streamline the National Environmental Policy Act (NEPA) compliance process. The Proposed Action addressed in this EA is to implement installation development actions as established in the community of all 319 ARW-approved plans for Grand Forks AFB over the next 5 years. This comprehensive approach better enables Grand Forks AFB to meet installation development requirements and to ensure readiness for future national defense missions. The projects analyzed in this EA fall under three general categories: facility demolition projects, facility construction projects (to include new construction, renovations, alterations, and repairs), and infrastructure projects.

In accordance with Executive Order 12372, *Intergovernmental Review of Federal Programs*, we request your participation and solicit comments on the attached Draft EA and FONSI/FONPA for this Proposed Action. Please provide your comments within 30 days from the date of this correspondence. If you require an additional 15 days for review, please request. Comments may include any issues or concerns related to the Proposed Action. Also enclosed is a copy of the distribution list of other Federal, state, and local agencies to be contacted regarding this Proposed Action. If you feel there are any additional agencies that should review and comment on the proposal, please feel free to include them in your distribution of this letter and the attached materials.

Please provide any comments or information directly to 319 CES/CEAO, Tuskegee Airmen Blvd, Grand Forks AFB ND 58205-6434, within 30 days from the date of this correspondence. If members of your staff have any questions, our point-of-contact is Ms. Diane Strom, 319 CES/CEAO, 701-747-6394, or e-mail to diane.strom@grandforks.af.mil.


MARY C. GILTNER
Base Civil Engineer

Attachment:
Draft EA and FONSI/FONPA

Appendix B

Interagency and Intergovernmental Coordination for Environmental Planning Distribution List

North Dakota State Water Commission
900 East Boulevard Avenue, Dept 770
Bismarck, ND 58505-0850

Tribal Historic Preservation Officer
Spirit Lake Tribal Council
P.O. Box 359
Fort Totten, ND 58335

Tribal Historic Preservation Officer
Red Lake Band of Chippewa Indians
P.O. Box 550
Red Lake, MN 56671

Mr. Jeff Towner
U.S. Fish and Wildlife Service
North Dakota Field Office
3425 Miriam Avenue
Bismarck, ND 58501-7926

Mr. Dean Hildebrand, Commissioner
North Dakota Game and Fish
100 North Bismarck Expressway
Bismarck, ND 58505-5095

Mr. Merlen E. Paaverud
State Historic Preservation Officer
State Historical Society of North Dakota
612 East Boulevard Avenue
Bismarck, ND 58505-0830

Ms. Kade Ferris, Director of Natural Resources
Turtle Mountain Band of Chippewa Indians
PO Box 900
Belcourt, ND 58316

Dr. Terry Dwelle, State Health Officer
North Dakota Department of Health
600 East Boulevard Avenue
Department 301
Bismarck, ND 58505-0200

Tribal Historic Preservation Officer
White Earth Band of Minnesota
Chippewa
PO Box 418
White Earth, MN 56591

Tribal Historic Preservation Officer
Indian Affairs Commission
600 East Boulevard Avenue
Bismarck, ND 58505-0300

Bismarck Regulatory Office
U.S. Army Corps of Engineers
1513 South 12th Street
Bismarck, ND 58504

U.S. Fish and Wildlife, Migratory Bird Office
PO Box 25486 DFC
Denver, CO 80225

APPENDIX C

AIR QUALITY EMISSION CALCULATIONS

Summary	Summarizes total emissions for all Proposed Action projects.
Combustion	Estimates emissions from non-road equipment exhaust.
Fugitive	Estimates particulate emissions from construction activities including earthmoving, vehicle traffic, and windblown dust.
Grading	Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions.
Haul Truck On-Road	Estimates emissions from haul and water trucks delivering materials to the job site.
Construction Commuter	Estimates emissions for construction workers commuting to the site.
AQCR Tier Report	Summarizes total emissions for the State of North Dakota Air Quality Control Region 172 Tier report for 2002, to be used to compare the project to regional emissions.

Air Quality Emissions from All Proposed Action Projects

	NO _x (ton)	VOC (ton)	CO (ton)	SO ₂ (ton)	PM ₁₀ (ton)	PM _{2.5} (ton)	CO ₂ (ton)
Construction Combustion	32.424	3.392	13.741	1.773	2.183	2.118	3,753.647
Construction Fugitive Dust	-	-	-	-	174.019	14.365	-
Haul Trucks	1.484	1.073	4.362	0.117	1.765	0.459	375.785
Construction Commuter	0.110	0.110	0.992	0.001	0.010	0.007	131.482
TOTAL	34.019	4.575	19.094	1.892	177.978	16.949	4,260.914

Note: Total CY2010 PM_{10/2.5} fugitive dust emissions are assuming USEPA 50% control efficiencies.

CO₂ emissions converted to metric tons = **3,864,649 metric tons**
State of North Dakota's CO₂ emissions = **53,550,515 metric tons (DOE/EIA 2005)**
Percent of North Dakota's CO₂ emissions = **0.007% metric tons**

Source: U.S. Department of Energy (DOE)/Energy Information Administration (EIA). 2005. State Carbon Dioxide Emissions Summary for the State of North Dakota. Available online: <http://www.eia.doe.gov/oiat/1605/state/state_emissions.html>. Accessed 9 December 2009

Since future year budgets were not readily available, actual 2002 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

State of North Dakota Air Quality Control Region 172

Year	Point and Area Sources Combined				
	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM _{2.5} (tpy)
2002	167,162	41,961	295,198	165,860	63,216

Source: USEPA-AirData NET Tier Report (<http://www.epa.gov/air/data/geosel.html>). Site visited on 9 December 2009.

Air Emissions from All Proposed Action Projects

Determination Significance (Significance Threshold = 10% of regional)

Point and Area Sources Combined				
NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM _{2.5} (tpy)
167,162	41,961	295,198	165,860	63,216
34.02	4.57	19.09	1.89	16.95
0.020%	0.011%	0.006%	0.001%	0.050%
				0.027%

Regional Emissions
Emissions
% of Regional

Combustion Emissions

Combustion Emissions of VOC, NO_x, SO₂, CO, PM_{2.5}, PM₁₀, and CO₂ due to Construction

General Construction Activities

Area Disturbed

Demolish Various Facilities
Construct Various Facilities
Construct Various Paved Surfaces (Parking Lots and Access Roads)
Total Land Disturbance

396,876 ft²
1,781,620 ft²
1,958,247 ft²
4,278,853 ft²

Total General Construction Area: 1,781,620 ft²
40.9 acres
Total Demolition Area: 396,876 ft²
9.1 acres
Total Pavement Area: 1,958,247 ft²
45.0 acres
Total Disturbed Area: 4,278,853 ft²
98.2 acres
Construction Duration: 12 months
Annual Construction Activity: 240 days/yr

Assume 12 months, 4 weeks per month, 5 days per week.

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Bulldozer	1	13.60	95.742%	5.50	1.02	0.89	0.87	1456.90
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64	1141.65
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47	4941.53

Paving

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34	401.93
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42	536.07
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93	4685.95
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69	5623.96

Demolition

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90	1360.10
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87	3703.07

Building Construction

Equipment ^d	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Stationary								
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22	213.06
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31	291.92
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22	112.39
Mobile (non-road)								
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54	572.24
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49	931.93
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74	4464.51

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Req'd. ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77
Total per 10 acres of activity	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77

- The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
- The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO₂ emissions by more than a factor of two.
- Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO _x	VOC	CO	SO ₂ **	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	10	416.412	25.770	157.099	8.328	25.455	24.691	49415.263
Paving Equipment	4	181.469	10.423	74.314	3.629	11.104	10.771	22495.827
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865	3703.074
Building Construction	4	157.585	12.519	69.529	12.465	11.316	10.977	17858.047
Air Compressor for Architectural Coating	4	14.296	1.493	6.262	1.005	1.237	1.200	1439.093
Architectural Coating**			108.784					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO_x = (Total Grading NO_x per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft ²)	Total Area (acres)	Total Days
Grading:	4,278,853	98.23	6
Paving:	1,958,247	44.96	54
Demolition:	396,876	9.11	456
Building Construction:	1,781,620	40.90	240
Architectural Coating	1,781,620	40.90	20

(from "Grading" worksheet)

(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative.

The 'Total Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition.

The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	2,498.47	154.62	942.59	49.97	152.73	148.15	296,492
Paving	9,753.97	560.23	3,994.36	195.08	596.86	578.95	1,209,151
Demolition	14,489.97	858.95	5,732.55	289.80	876.11	849.83	1,686,939
Building Construction	37,820.47	3,004.62	16,687.02	2,991.70	2,715.88	2,634.41	4,285,931
Architectural Coatings	285.93	2,205.54	125.23	20.09	24.75	24.00	28,782
Total Emissions (lbs):	64,848.80	6,783.95	27,481.75	3,546.63	4,366.33	4,235.34	7,507,294

Results: Total Project Annual Emission Rates

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Total Project Emissions (lbs)	64,848.80	6,783.95	27,481.75	3,546.63	4,366.33	4,235.34	7,507,294
Total Project Emissions (tons)	32.42	3.39	13.74	1.77	2.18	2.12	3,753.65

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006

PM_{2.5} Emissions

PM_{2.5} Multiplier 0.10 (10% of PM₁₀ emissions assumed to be PM_{2.5}) EPA 2001; EPA 2006

Control Efficiency

0.50 (assume 50% control efficiency for PM₁₀ and PM_{2.5} emissions) EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM₁₀/acre-month)

Duration of Construction Project 12 months
Area 45.0 acres

General Construction Activities (0.19 ton PM₁₀/acre-month)

Duration of Construction Project 12 months
Area 53.3 acres

Project Emissions (tons/year)			
	PM₁₀ uncontrolled	PM₁₀ controlled	PM_{2.5} controlled
New Roadway Construction	226.57	113.29	11.33
General Construction Activities	121.46	60.73	3.04
Total	348.04	174.02	14.37

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM₁₀/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM₁₀/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM₁₀/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM₁₀/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM₁₀/acre-month) and 75% of the average emission factor (0.11 ton PM₁₀/acre-month). The 0.19 ton PM₁₀/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM₁₀/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP), which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM₁₀ and PM_{2.5} in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM₁₀/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM₁₀/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM₁₀/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

PM_{2.5} Multiplier

PM_{2.5} emissions are estimated by applying a particle size multiplier of 0.10 to PM₁₀ emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM₁₀ and PM_{2.5}

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM₁₀ and PM_{2.5} in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999*. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Grading Schedule

Estimate of time required to grade a specified area.

Input Parameters 98.2 acres/yr (from Combustion Worksheet)
Construction area: 30.0 (calculated based on 3 pieces of equipment for every 10 acres)
Qty Equipment:

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day	equip-days per acre	Acres/yr (project- specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	98.23	12.28
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	98.23	48.02
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	49.11	49.52
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	49.11	20.32
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	98.23	34.45
TOTAL								164.59

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 164.59
Qty Equipment: 30.00
Grading days/yr: 5.49

Construction Commuter Emissions

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>.

Assumptions:

Passenger vehicle emission factors for scenario year 2010 are used

The average roundtrip commute for a construction worker = 40 miles

Number of construction days = 240 days

Number of construction workers (daily) = 25 people

Passenger Vehicle Emission Factors for Year 2010 (lbs/mile)

NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
0.00091814	0.00091399	0.00826276	0.00001077	0.00008698	0.00005478	1.09568235

updated April 24, 2008. Available online: <<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>>. Accessed 27 May 2009.

Notes:

The SMAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC

Construction Commuter Emissions

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	220.354	219.357	1983.062	2.586	20.875	13.148	262963.764
tons	0.110	0.110	0.992	0.0013	0.0104	0.0066	131.482

Example Calculation: NO_x emissions (lbs) = 60 miles/day * NO_x emission factor (lb/mile) * number of construction days * number of workers

Haul and Water Truck Emissions

Emissions from hauling the raw materials for concrete and fill are estimated in this spreadsheet.
Emission Estimation Method: United States Air Force (USAF) Institute for Environment, Safety and Occupational Health Risk Analysis (IERA) Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations (Revised December 2003).

Raw Material Assumptions:

Haul trucks carry 20 cubic yards of material per trip.
The distance from the borrow pit is 5 miles, therefore the haul truck will travel 10 miles roundtrip.
Estimated number of trips required by haul trucks = total amount of material to be brought on installation/20 cubic yards per truck

Total amount of imported materials = 384,325 cubic yards
Number of trucks required = 19,216 heavy duty diesel haul trucks
Miles per trip = 10 miles

Assumptions:
All new construction projects would require 5 ft deep fill/aggregate
All pavement projects require 3 inches of asphalt and 6 inches of aggregate

Water Transportation Assumptions:

Water trucks carry 4,000 gallons per truckload.
Approximately 60,037,098 gallons of water will be required during construction, demolition, and infrastructure activities.
Approximately 1/8 inch of water would be applied to project area once per day.
The distance from the nearest water source is 0.5 miles, therefore the water truck will travel 1 mile roundtrip.
Estimated number of trips required by water trucks = total gallons of water to be brought to project site/4,000 gallons per truck

Total amount of water needed for construction = 60,010,913 gallons
Number of trucks required = 15,003 heavy duty diesel haul trucks
Miles per trip = 1 miles

Heavy Duty Diesel Vehicle (HDDV) Average Emission Factors (grams/mile)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
HDDV	6.500	4.7000	19.10	0.512	7.7	2.01	1646

Notes:
Emission factors for all pollutants except CO₂ are from USAF IERA 2003.
Emission factors for PM, PM₁₀, SO_x are from HDDV in Table 4-50 (USAF IERA 2003).
Emission factors for VOC, CO, and NO_x are from Tables 4-41 through 4-43 for the 2010 calendar year, 2000 model year (USAF IERA 2003).
Diesel fuel produces 22,384 pounds of CO₂ per gallon.
It is assumed that the average HDDV has a fuel economy of 6.17 miles per gallon, Table 4-51 (USAF IERA 2003)
CO₂ emission factor = 22,384 lbs CO₂/gallon diesel * gallon diesel/6.17 miles * 453.6 g/lb

HDDV Haul and Water Truck Emissions From Construction Activities

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	2968.64	2146.56	8723.24	233.84	3530.40	917.99	751570.62
tons	1.484	1.073	4.362	0.117	1.765	0.459	375.785

Example Calculation: NO_x emissions (lbs) = miles per trip * number of trips * NO_x emission factor (g/mile) * lb/453.6 g

State of North Dakota Air Quality Control Region 172

Row #	State	County	Point Source Emissions					Area Source Emissions (Non-Point and Mobile Sources)									
			CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC			
1	ND	Adams Co	0	0	0	0	0	0	1,789	533	4,911	763	57.3	308			
2	ND	Barnes Co	0	0	0	0	0	0	7,832	3,740	9,687	1,605	355	949			
3	ND	Benson Co	0	0	0	0	0	0	4,941	1,130	7,364	1,173	145	700			
4	ND	Billings Co	34.9	41.7	3.11	3.11	283	3.5	2,588	1,365	1,421	276	89.9	430			
5	ND	Bottineau Co	0	0	0	0	0	0	5,583	1,559	7,809	1,315	179	723			
6	ND	Bowman Co	0	0	0	0	0	0	2,250	738	2,716	447	73	390			
7	ND	Burke Co	57.3	181	0.71	0.6	426	5.2	2,375	885	5,894	960	97.3	386			
8	ND	Burling Co	0	0	0	0	0	0	22,345	4,560	10,005	1,495	713	3,001			
9	ND	Cavalier Co	0	0	0	0	0	0	4,094	1,489	11,343	1,810	166	547			
10	ND	Dickey Co	0	0	0	0	0	0	4,045	940	7,102	1,117	120	607			
11	ND	Divide Co	0	0	0	0	0	0	2,457	888	5,056	844	104	394			
12	ND	Dunn Co	96.8	100	0.84	0.51	5.3	13	2,845	737	4,129	676	93.7	438			
13	ND	Edley Co	0	0	0	0	0	0	2,038	1,125	3,357	558	91.7	328			
14	ND	Emmons Co	0	0	0	0	0	0	2,911	652	5,232	822	84.8	414			
15	ND	Foster Co	0	0	0	0	0	0	2,738	1,417	5,335	859	119	394			
16	ND	Golden Valley Co	0	0	0	0	0	0	2,762	2,067	2,572	470	152	392			
17	ND	Grand Forks Co	144	229	26.3	3.74	641	1.4	22,803	3,557	12,685	2,030	740	2,951			
18	ND	Grant Co	0	0	0	0	0	0	2,188	550	5,993	946	59.6	380			
19	ND	Griggs Co	0	0	0	0	0	0	2,210	1,263	4,956	805	128	369			
20	ND	Hettinger Co	0	0	0	0	0	0	2,321	798	4,880	801	81.6	335			
21	ND	Kidder Co	0	0	0	0	0	0	4,762	2,178	4,930	824	153	672			
22	ND	LaMoure Co	0	0	0	0	0	0	3,540	1,113	7,937	1,269	146	498			
23	ND	Logan Co	0	0	0	0	0	0	1,833	451	3,177	520	57.4	300			
24	ND	McHenry Co	0.9	47	54.6	23.7	0.2	107	4,474	2,296	6,810	1,123	214	668			
25	ND	McIntosh Co	95.9	105	0.9	0.55	6	12.8	2,497	598	4,067	647	86.4	355			
26	ND	McKenzie Co	205	578	3.49	3.31	213	13	4,474	964	6,060	961	103	688			
27	ND	McLean Co	1,908	10,357	2,911	2,349	24,428	153	7,588	1,734	11,053	1,748	179	1,206			
28	ND	Merced Co	3,974	45,350	3,334	2,904	91,617	588	5,111	768	3,341	576	96.4	1,085			
29	ND	Morton Co	752	1,883	882	826	6,833	182	13,145	3,141	8,295	1,305	339	1,463			
30	ND	Mountrail Co	0	0	0	0	0	0	5,348	1,897	6,831	1,113	195	803			
31	ND	Nelson Co	0	0	0	0	0	0	2,670	752	6,055	949	89.6	381			
32	ND	Oliver Co	1,100	22,845	1,390	1,256	28,565	241	1,717	374	2,573	425	46.1	271			
33	ND	Pembina Co	568	758	193	78.7	730	145	8,051	1,889	8,196	1,264	275	817			
34	ND	Pierce Co	0	0	0	0	0	0	2,344	1,110	5,630	924	136	570			
35	ND	Ramsey Co	0	0	0	0	0	0	5,281	1,248	7,615	1,223	170	823			
36	ND	Ransom Co	106	69	56.1	35.4	1.5	298	2,798	894	5,598	895	140	409			
37	ND	Renville Co	0	0	0	0	0	0	2,627	992	5,270	875	102	390			
38	ND	Richland Co	703	390	55.5	20.2	149	3	11,983	3,239	11,698	1,906	573	1,563			
39	ND	Rollette Co	0	0	0	0	0	0	7,942	1,194	7,948	1,179	182	953			
40	ND	Sargent Co	0	0	0	0	0	0	3,262	981	7,487	1,190	287	493			
41	ND	Sheridan Co	0	0	0	0	0	0	1,893	626	3,952	655	69.2	366			
42	ND	Sioux Co	0	0	0	0	0	0	2,362	355	2,875	362	55.5	328			
43	ND	Slope Co	0	0	0	0	0	0	1,314	633	1,944	352	55.2	351			
44	ND	Stark Co	60.5	180	0	0	0.3	17.5	11,710	3,396	6,239	1,019	399	1,471			
45	ND	Steele Co	0	0	0	0	0	0	2,078	1,005	5,764	942	107	332			
46	ND	Suetsman Co	0	0	0	0	0	0	12,048	4,131	11,090	1,852	380	1,679			
47	ND	Towner Co	0	0	0	0	0	0	2,607	826	7,985	1,273	115	378			
48	ND	Trail Co	684	446	126	53.1	479	15.5	7,800	1,855	10,296	1,603	167	845			
49	ND	Walsh Co	0	0	0	0	0	0	8,114	1,892	9,819	1,555	291	1,006			
50	ND	Ward Co	0	0	0	0	0	0	17,079	4,279	14,872	2,366	561	2,399			
51	ND	Wells Co	0	0	0	0	0	0	3,959	1,943	9,669	1,546	187	549			
52	ND	Williams Co	527	2,313	25.1	25.1	1,605	45.4	8,645	2,542	8,750	1,420	269	1,364			
Grand Total			11,017	85,873	9,063	7,583	155,982	2,029	284,181	81,289	346,273	55,633	9,878	39,932			

Grand Forks Co

CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
22,947	3,786	12,711	2,034	1,381	2,952

State of North Dakota Air Quality Control Region 172 (40 CFR 81.335)

SOURCE:
<http://www.epa.gov/air/data/geosel.html>
 USEPA - AirData NET Tier Report
 *Net Air pollution sources (area and point) in tons per year (2002)
 Site visited on 9 December 2009.

Summary	Summarizes total emissions by calendar year for Demolish Munitions Storage Area Revised Plan (Buildings 701, 712, 717, 723 to 729, and 737).
Combustion	Estimates emissions from non-road equipment exhaust.
Fugitive	Estimates particulate emissions from construction activities including earthmoving, vehicle traffic, and windblown dust.
Grading	Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions.
Construction Commuter	Estimates emissions for construction workers commuting to the site.
AQCR Tier Report	Summarizes total emissions for the State of North Dakota Air Quality Control Region 172 Tier report for 2002, to be used to compare the project to regional emissions.

Air Quality Emissions from Demolish Munitions Storage Area Revised Plan (Buildings 701, 712, 717, 723 to 729, and 737)

	NO _x (ton)	VOC (ton)	CO (ton)	SO ₂ (ton)	PM ₁₀ (ton)	PM _{2.5} (ton)	CO ₂ (ton)
Construction Combustion	1.041	0.062	0.412	0.021	0.063	0.061	121,284
Construction Fugitive Dust	-	-	-	-	0.366	0.018	-
Construction Commuter	0.028	0.027	0.248	0.0003	0.003	0.002	32,870
TOTAL	1.069	0.089	0.659	0.021	0.431	0.081	154,155

Note: Total CY2010 PM_{10/2.5} fugitive dust emissions are assuming USEPA 50% control efficiencies.

CO₂ emissions converted to metric tons = **139,818 metric tons**
State of North Dakota's CO₂ emissions = **53,550,515 metric tons (DOE/EIA 2005)**
Percent of North Dakota's CO₂ emissions = **0.0003% metric tons**

Source: U.S. Department of Energy (DOE)/Energy Information Administration (EIA). 2005. State Carbon Dioxide Emissions Summary for the State of North Dakota. Available online: <http://www.eia.doe.gov/oiat/1605/state/state_emissions.html>. Accessed 9 December 2009

Since future year budgets were not readily available, actual 2002 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

State of North Dakota Air Quality Control Region 172

Year	Point and Area Sources Combined					
	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)
2002	167,162	41,961	295,198	165,860	355,336	63,216

Source: USEPA-AirData NET Tier Report (<http://www.epa.gov/air/data/geosel.html>). Site visited on 9 December 2009.

Air Emissions from Demolish Munitions Storage Area Revised Plan (Buildings 701, 712, 717, 723 to 729, and 737)
Determination Significance (Significance Threshold = 10% of regional)

Point and Area Sources Combined					
NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)
167,162	41,961	295,198	165,860	355,336	63,216
1.07	0.09	0.66	0.02	0.43	0.08
0.001%	0.0002%	0.0002%	0.00001%	0.0001%	0.0001%

Regional Emissions
Emissions
% of Regional

Combustion Emissions

Combustion Emissions of VOC, NO_x, SO₂, CO, PM_{2.5}, PM₁₀, and CO₂ due to Construction

General Construction Activities

Demolish Munitions Storage Area Revised Plan (Buildings 701, 712, 717, 723 to 729, and 737)

Area Disturbed

55,905 ft²

Total General Construction Area:	0 ft ²
	0.000 acres
Total Demolition Area:	55,905 ft ²
	1.3 acres
Total Pavement Area:	0.000 ft ²
	0.000 acres
Total Disturbed Area:	55,905 ft ²
	1.3 acres
Construction Duration:	3 months
Annual Construction Activity:	60 days/yr

Assume 3 months, 4 weeks per month, 5 days per week.

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87	1456.90
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64	1141.65
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47	4941.53

Paving

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34	401.93
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42	536.07
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93	4685.95
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69	5623.96

Demolition

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90	1360.10
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87	3703.07

Building Construction

Equipment ^d	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Stationary								
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22	213.06
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31	291.92
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22	112.39
Mobile (non-road)								
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54	572.24
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49	931.93
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74	4464.51

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77
Total per 10 acres of activity	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77

- The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
- The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO₂ emissions by more than a factor of two.
- Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO _x	VOC	CO	SO ₂ **	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469	4941.526
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693	5623.957
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865	3703.074
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744	4464.512
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.251	0.309	0.300	359.773
Architectural Coating**			0.000					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO_x = (Total Grading NO_x per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft ²)	Total Area (acres)	Total Days
Grading:	55,905	1.28	1
Paving:	0	0.00	0
Demolition:	55,905	1.28	64
Building Construction:	0	0.00	0
Architectural Coating	0	0.00	0

(from "Grading" worksheet)

(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	41.64	2.58	15.71	0.83	2.55	2.47	4,942
Paving	-	-	-	-	-	-	0
Demolition	2,041.10	120.99	807.50	40.82	123.41	119.71	237,627
Building Construction	-	-	-	-	-	-	0
Architectural Coatings	-	-	-	-	-	-	0
Total Emissions (lbs):	2,082.74	123.57	823.21	41.65	125.96	122.18	242,568

Results: Total Project Annual Emission Rates

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Total Project Emissions (lbs)	2,082.74	123.57	823.21	41.65	125.96	122.18	242,568
Total Project Emissions (tons)	1.04	0.06	0.41	0.02	0.06	0.06	121.28

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006

PM_{2.5} Emissions

PM _{2.5} Multiplier	0.10	(10% of PM ₁₀ emissions assumed to be PM _{2.5})	EPA 2001; EPA 2006
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Control Efficiency

	0.50	(assume 50% control efficiency for PM ₁₀ and PM _{2.5} emissions)	EPA 2001; EPA 2006
--	------	--	--------------------

Project Assumptions

New Roadway Construction (0.42 ton PM₁₀/acre-month)

Duration of Construction Project	-	months
Area	-	acres

General Construction Activities (0.19 ton PM₁₀/acre-month)

Duration of Construction Project	3	months
Area	1.3	acres

	Project Emissions (tons/year)		
	PM₁₀ uncontrolled	PM₁₀ controlled	PM_{2.5} controlled
New Roadway Construction	0.00	0.00	0.00
General Construction Activities	0.73	0.37	0.02
Total	0.73	0.37	0.02

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10} /acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10} /acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10} /acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10} /acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10} /acre-month) and 75% of the average emission factor (0.11 ton PM_{10} /acre-month). The 0.19 ton PM_{10} /acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10} /acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP), which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10} /acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10} /acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM_{10} /acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999*. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.
EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.
MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Grading Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 1.3 acres/yr (from Combustion Worksheet)
Qty Equipment: 3.0 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day	equip-days per acre	Acres/yr (project- specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	1.28	0.16
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	1.28	0.63
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	0.64	0.65
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	0.64	0.27
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	1.28	0.45
TOTAL								2.15

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 2.15
Qty Equipment: 3.00
Grading days/yr: 0.72

Construction Commuter Emissions

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>.

Assumptions:

Passenger vehicle emission factors for scenario year 2010 are used

The average roundtrip commute for a construction worker = 40 miles

Number of construction days = 60 days

Number of construction workers (daily) = 25 people

Passenger Vehicle Emission Factors for Year 2010 (lbs/mile)

NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
0.00091814	0.00091399	0.00826276	0.00001077	0.00008698	0.00005478	1.09568235

updated April 24, 2008. Available online: <<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>>. Accessed 27 May 2009.

Notes:

The SMAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC

Construction Commuter Emissions

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	55.088	54.839	495.765	0.646	5.219	3.287	65740.941
tons	0.028	0.027	0.248	0.0003	0.0026	0.0016	32.870

Example Calculation: NO_x emissions (lbs) = 60 miles/day * NO_x emission factor (lb/mile) * number of construction days * number of workers

State of North Dakota Air Quality Control Region 172

Row #	State	County	Point Source Emissions					Area Source Emissions (Non-Point and Mobile Sources)						
			CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
1	ND	Adams Co	0	0	0	0	0	0	1,799	533	4,911	763	57.3	308
2	ND	Barnes Co	0	0	0	0	0	0	7,832	3,740	9,687	1,605	355	949
3	ND	Benson Co	0	0	0	0	0	0	4,941	1,130	7,364	1,173	145	700
4	ND	Billings Co	34.9	41.7	3.11	3.11	283	3.5	2,588	1,365	1,421	276	89.9	430
5	ND	Bottineau Co	0	0	0	0	0	0	5,583	1,559	7,809	1,315	179	723
6	ND	Bowman Co	0	0	0	0	0	0	2,250	738	2,716	447	73	390
7	ND	Burke Co	57.3	181	0.71	0.6	426	5.2	2,375	885	5,894	960	97.3	386
8	ND	Burleigh Co	0	0	0	0	0	0	22,345	4,560	10,005	1,495	713	3,001
9	ND	Cavalier Co	0	0	0	0	0	0	4,094	1,489	11,343	1,810	166	547
10	ND	Dickey Co	0	0	0	0	0	0	4,045	940	7,102	1,117	120	607
11	ND	Divide Co	0	0	0	0	0	0	2,457	888	5,056	844	104	394
12	ND	Dunn Co	96.8	100	0.84	0.51	5.3	13	2,845	737	4,129	676	93.7	438
13	ND	Eddy Co	0	0	0	0	0	0	2,038	1,125	3,357	558	91.7	328
14	ND	Emmons Co	0	0	0	0	0	0	2,911	652	5,232	822	84.8	414
15	ND	Foster Co	0	0	0	0	0	0	2,738	1,417	5,335	859	119	394
16	ND	Co	0	0	0	0	0	0	2,762	2,067	2,572	470	152	392
17	ND	Grand Forks Co	144	229	26.3	3.74	641	1.4	22,803	3,557	12,685	2,030	740	2,951
18	ND	Grant Co	0	0	0	0	0	0	2,188	550	5,993	946	59.6	380
19	ND	Grogs Co	0	0	0	0	0	0	2,210	1,263	4,956	805	128	369
20	ND	Hettinger Co	0	0	0	0	0	0	2,321	798	4,880	801	81.6	335
21	ND	Kidder Co	0	0	0	0	0	0	4,762	2,178	4,930	824	153	672
22	ND	LaMoure Co	0	0	0	0	0	0	3,540	1,113	7,937	1,269	146	498
23	ND	Logan Co	0	0	0	0	0	0	1,833	451	3,177	520	57.4	300
24	ND	McHenry Co	0.9	47	54.6	23.7	0.2	107	4,474	2,296	6,810	1,123	214	668
25	ND	McIntosh Co	95.9	105	0.9	0.55	6	12.8	2,497	598	4,067	647	86.4	355
26	ND	McKenzie Co	205	578	3.49	3.31	213	13	4,474	964	6,060	961	103	688
27	ND	McLean Co	1,908	10,357	2,911	2,349	24,428	153	7,588	1,734	11,053	1,748	179	1,206
28	ND	Mercer Co	3,974	45,350	3,334	2,904	91,617	588	5,111	768	3,341	576	96.4	1,085
29	ND	Morton Co	752	1,883	882	826	6,833	182	13,145	3,141	8,295	1,305	339	1,463
30	ND	Mountrail Co	0	0	0	0	0	0	5,348	1,897	6,831	1,113	195	803
31	ND	Nelson Co	0	0	0	0	0	0	2,670	752	6,055	949	89.6	381
32	ND	Oliver Co	1,100	22,845	1,390	1,256	28,565	241	1,717	374	2,573	425	46.1	271
33	ND	Pembina Co	588	758	193	78.7	730	145	8,051	1,889	8,196	1,264	275	817
34	ND	Pierce Co	0	0	0	0	0	0	2,344	1,110	5,630	924	138	570
35	ND	Ramsey Co	0	0	0	0	0	0	5,281	1,248	7,615	1,223	170	823
36	ND	Ransom Co	106	69	56.1	35.4	1.5	298	2,798	894	5,598	895	140	409
37	ND	Renville Co	0	0	0	0	0	0	2,627	992	5,270	875	102	390
38	ND	Richland Co	703	390	55.5	20.2	149	3	11,983	3,239	11,698	1,906	573	1,563
39	ND	Rolette Co	0	0	0	0	0	0	7,942	1,194	7,948	1,179	182	953
40	ND	Sargent Co	0	0	0	0	0	0	3,262	981	7,487	1,190	287	493
41	ND	Sheridan Co	0	0	0	0	0	0	1,893	626	3,952	655	69.2	386
42	ND	Sioux Co	0	0	0	0	0	0	2,362	355	2,875	362	55.5	328
43	ND	Slope Co	0	0	0	0	0	0	1,314	633	1,944	352	55.2	351
44	ND	Stark Co	60.5	180	0	0	0.3	17.5	11,710	3,396	6,239	1,019	399	1,471
45	ND	Steele Co	0	0	0	0	0	0	2,078	1,005	5,764	942	107	332
46	ND	Stutsman Co	0	0	0	0	0	0	185	12,048	4,131	11,090	1,852	380
47	ND	Towner Co	0	0	0	0	0	0	2,607	826	7,985	1,273	115	378
48	ND	Trail Co	684	446	126	53.1	479	15.5	7,800	1,855	10,296	1,603	167	845
49	ND	Walsh Co	0	0	0	0	0	0	8,114	1,892	9,819	1,555	291	1,006
50	ND	Ward Co	0	0	0	0	0	0	17,079	4,279	14,872	2,366	561	2,399
51	ND	Wells Co	0	0	0	0	0	0	3,959	1,943	9,689	1,546	187	549
52	ND	Williams Co	527	2,313	25.1	25.1	1,605	45.4	8,645	2,542	8,750	1,420	269	1,364
Grand Total			11,017	85,873	9,063	7,583	155,982	2,029	284,181	81,289	346,273	55,633	9,878	39,932

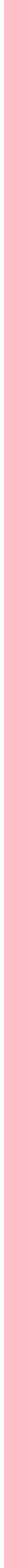
SOURCE: <http://www.epa.gov/air/data/geosel.html>
 USEPA - AirData NET Tier Report
 *Net Air pollution sources (area and point) in tons per year (2002)
 Site visited on 9 December 2009.

State of North Dakota Air Quality Control Region 172 (40 CFR 81.335)

CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
22,947	3,786	12,711	2,034	1,381	2,952

Grand Forks Co

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Summary	Summarizes total emissions by calendar year for Demolish Buildings 304 and 515 in support of Construct Consolidated Security Forces
Combustion	Estimates emissions from non-road equipment exhaust.
Fugitive	Estimates particulate emissions from construction activities including earthmoving, vehicle traffic, and windblown dust.
Grading	Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions.
Construction Commuter	Estimates emissions for construction workers commuting to the site.
AQCR Tier Report	Summarizes total emissions for the State of North Dakota Air Quality Control Region 172 Tier report for 2002, to be used to compare the project to regional emissions.

Air Quality Emissions from Demolish Buildings 304 and 515 in support of Construct Consolidated Security Forces

	NO _x (ton)	VOC (ton)	CO (ton)	SO ₂ (ton)	PM ₁₀ (ton)	PM _{2.5} (ton)	CO ₂ (ton)
Construction Combustion	0.434	0.026	0.171	0.009	0.026	0.025	50.568
Construction Fugitive Dust	-	-	-	-	0.099	0.005	-
Construction Commuter	0.018	0.018	0.165	0.0002	0.002	0.001	21.914
TOTAL	0.452	0.044	0.337	0.009	0.127	0.031	72.481

Note: Total CY2010 PM_{10/2.5} fugitive dust emissions are assuming USEPA 50% control efficiencies.

CO₂ emissions converted to metric tons = **65.741 metric tons**
State of North Dakota's CO₂ emissions = **53,550,515 metric tons (DOE/EIA 2005)**
Percent of North Dakota's CO₂ emissions = **0.0001% metric tons**

Source: U.S. Department of Energy (DOE)/Energy Information Administration (EIA). 2005. State Carbon Dioxide Emissions Summary for the State of North Dakota. Available online: <http://www.eia.doe.gov/oiat/1605/state/state_emissions.html>. Accessed 9 December 2009

Since future year budgets were not readily available, actual 2002 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

State of North Dakota Air Quality Control Region 172

Year	Point and Area Sources Combined				
	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM _{2.5} (tpy)
2002	167,162	41,961	295,198	165,860	355,336

Source: USEPA-AirData NET Tier Report (<http://www.epa.gov/air/data/geosel.html>). Site visited on 9 December 2009.

Air Emissions from Demolish Buildings 304 and 515 in support of Construct Consolidated Security Forces
Determination Significance (Significance Threshold = 10% of regional)

Point and Area Sources Combined				
NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM _{2.5} (tpy)
167,162	41,961	295,198	165,860	355,336
0.45	0.04	0.34	0.01	0.13
0.0003%	0.0001%	0.0001%	0.00004%	0.00005%

Regional Emissions
Emissions
% of Regional

Combustion Emissions

Combustion Emissions of VOC, NO_x, SO₂, CO, PM_{2.5}, PM₁₀, and CO₂ due to Construction

General Construction Activities

Demolish Buildings 304 and 515 in support of Construct Consolidated Security Forces

Area Disturbed

22,631 ft²

Total General Construction Area:

0 ft²

0.000 acres

Total Demolition Area:

22,631 ft²

0.5 acres

Total Pavement Area:

0.000 ft²

0.000 acres

Total Disturbed Area:

22,631 ft²

0.5 acres

Construction Duration:

2 months

Annual Construction Activity:

40 days/yr

Assume 2 months, 4 weeks per month, 5 days per week.

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87	1456.90
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64	1141.65
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47	4941.53

Paving

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34	401.93
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42	536.07
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93	4685.95
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69	5623.96

Demolition

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90	1360.10
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87	3703.07

Building Construction

Equipment ^d	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Stationary								
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22	213.06
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31	291.92
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22	112.39
Mobile (non-road)								
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54	572.24
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49	931.93
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74	4464.51

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77
Total per 10 acres of activity	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77

- The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
- The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO₂ emissions by more than a factor of two.
- Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO _x	VOC	CO	SO ₂ **	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469	4941.526
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693	5623.957
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865	3703.074
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744	4464.512
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.251	0.309	0.300	359.773
Architectural Coating**			0.000					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO_x = (Total Grading NO_x per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft ²)	Total Area (acres)	Total Days
Grading:	22,631	0.52	1
Paving:	0	0.00	0
Demolition:	22,631	0.52	26
Building Construction:	0	0.00	0
Architectural Coating	0	0.00	0

(from "Grading" worksheet)

(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	41.64	2.58	15.71	0.83	2.55	2.47	4,942
Paving	-	-	-	-	-	-	0
Demolition	826.26	48.98	326.89	16.53	49.96	48.46	96,194
Building Construction	-	-	-	-	-	-	0
Architectural Coatings	-	-	-	-	-	-	0
Total Emissions (lbs):	867.90	51.56	342.60	17.36	52.50	50.93	101,136

Results: Total Project Annual Emission Rates

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Total Project Emissions (lbs)	867.90	51.56	342.60	17.36	52.50	50.93	101,136
Total Project Emissions (tons)	0.43	0.03	0.17	0.01	0.03	0.03	50.57

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19 ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006	
New Road Construction	0.42 ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006	

PM_{2.5} Emissions

PM _{2.5} Multiplier	0.10	(10% of PM ₁₀ emissions assumed to be PM _{2.5})	EPA 2001; EPA 2006
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Control Efficiency

	0.50	(assume 50% control efficiency for PM ₁₀ and PM _{2.5} emissions)	EPA 2001; EPA 2006
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Project Assumptions

New Roadway Construction (0.42 ton PM₁₀/acre-month)

Duration of Construction Project	-	months
Area	-	acres

General Construction Activities (0.19 ton PM₁₀/acre-month)

Duration of Construction Project	2	months
Area	0.5	acres

	Project Emissions (tons/year)		
	PM₁₀ uncontrolled	PM₁₀ controlled	PM_{2.5} controlled
New Roadway Construction	0.00	0.00	0.00
General Construction Activities	0.20	0.10	0.00
Total	0.20	0.10	0.00

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10} /acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10} /acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10} /acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10} /acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10} /acre-month) and 75% of the average emission factor (0.11 ton PM_{10} /acre-month). The 0.19 ton PM_{10} /acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10} /acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP), which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10} /acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10} /acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM_{10} /acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999*. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.
EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.
MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Grading Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 0.5 acres/yr (from Combustion Worksheet)
Qty Equipment: 3.0 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project- specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	0.52	0.06
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	0.52	0.25
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	0.26	0.26
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	0.26	0.11
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	0.52	0.18
TOTAL								0.87

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 0.87
Qty Equipment: 3.00
Grading days/yr: 0.29

Construction Commuter Emissions

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>.

Assumptions:

Passenger vehicle emission factors for scenario year 2010 are used

The average roundtrip commute for a construction worker = 40 miles

Number of construction days = 40 days

Number of construction workers (daily) = 25 people

Passenger Vehicle Emission Factors for Year 2010 (lbs/mile)

NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
0.00091814	0.00091399	0.00826276	0.00001077	0.00008698	0.00005478	1.09568235

updated April 24, 2008. Available online: <<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>>. Accessed 27 May 2009.

Notes:

The SMAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC

Construction Commuter Emissions

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	36.726	36.560	330.510	0.431	3.479	2.191	43827.294
tons	0.018	0.018	0.165	0.0002	0.0017	0.0011	21.914

Example Calculation: NO_x emissions (lbs) = 60 miles/day * NO_x emission factor (lb/mile) * number of construction days * number of workers

State of North Dakota Air Quality Control Region 172

Row #	State	County	Point Source Emissions				Area Source Emissions (Non-Point and Mobile Sources)							
			CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
1	ND	Adams Co	0	0	0	0	0	0	1,799	533	4,911	763	57.3	308
2	ND	Barnes Co	0	0	0	0	0	0	7,832	3,740	9,687	1,605	355	949
3	ND	Benson Co	0	0	0	0	0	0	4,941	1,130	7,364	1,173	145	700
4	ND	Billings Co	34.9	41.7	3.11	3.11	283	3.5	2,588	1,365	1,421	276	89.9	430
5	ND	Boileau Co	0	0	0	0	0	0	5,583	1,559	7,809	1,315	179	723
6	ND	Bowman Co	0	0	0	0	0	0	2,250	738	2,716	447	73	390
7	ND	Burke Co	57.3	181	0.71	0.6	426	5.2	2,375	885	5,894	960	97.3	386
8	ND	Burlinghe Co	0	0	0	0	0	0	22,345	4,560	10,005	1,495	713	3,001
9	ND	Cavalier Co	0	0	0	0	0	0	4,094	1,489	11,343	1,810	166	547
10	ND	Dickey Co	0	0	0	0	0	0	4,045	940	7,102	1,117	120	607
11	ND	Divide Co	0	0	0	0	0	0	2,457	888	5,056	844	104	394
12	ND	Dunn Co	96.8	100	0.84	0.51	53	13	2,845	737	4,129	676	93.7	438
13	ND	Eddy Co	0	0	0	0	0	0	2,038	1,125	3,357	558	91.7	328
14	ND	Emmons Co	0	0	0	0	0	0	2,911	652	5,232	822	84.8	414
15	ND	Foster Co	0	0	0	0	0	0	2,738	1,417	5,335	859	119	394
16	ND	Golden Valley Co	0	0	0	0	0	0	2,762	2,067	2,572	470	152	392
17	ND	Grand Forks Co	144	229	26.3	3.74	641	1.4	22,803	3,557	12,685	2,030	740	2,951
18	ND	Grant Co	0	0	0	0	0	0	2,188	550	5,993	946	59.6	380
19	ND	Griggs Co	0	0	0	0	0	0	2,210	1,263	4,956	805	128	369
20	ND	Hettinger Co	0	0	0	0	0	0	2,321	798	4,880	801	81.6	335
21	ND	Kidder Co	0	0	0	0	0	0	4,762	2,178	4,930	824	153	672
22	ND	LaMoure Co	0	0	0	0	0	0	3,540	1,113	7,937	1,269	146	498
23	ND	Logan Co	0	0	0	0	0	0	1,833	451	3,177	520	57.4	300
24	ND	McHenry Co	0.9	47	54.6	23.7	0.2	107	4,474	2,296	6,810	1,123	214	668
25	ND	McIntosh Co	95.9	105	0.9	0.55	6	12.8	2,497	598	4,067	647	86.4	355
26	ND	McKenzie Co	205	578	3.49	3.31	213	13	4,474	964	6,060	961	103	688
27	ND	McLean Co	1,908	10,357	2,911	2,349	24,428	153	7,588	1,734	11,053	1,748	179	1,206
28	ND	Mercer Co	3,974	45,350	3,334	2,904	91,617	588	5,111	768	3,341	576	96.4	1,085
29	ND	Morton Co	752	1,883	882	826	6,833	182	13,145	3,141	8,295	1,305	339	1,463
30	ND	Mountrail Co	0	0	0	0	0	0	5,348	1,897	6,831	1,113	195	803
31	ND	Nelson Co	0	0	0	0	0	0	2,670	752	6,055	949	89.6	381
32	ND	Oliver Co	1,100	22,845	1,390	1,256	28,565	241	1,717	374	2,573	425	46.1	271
33	ND	Pembina Co	588	758	193	78.7	730	145	8,051	1,889	8,196	1,264	275	817
34	ND	Pierce Co	0	0	0	0	0	0	2,344	1,110	5,630	924	138	570
35	ND	Ramsey Co	0	0	0	0	0	0	5,281	1,248	7,615	1,223	170	823
36	ND	Ransom Co	106	69	56.1	35.4	1.5	298	2,798	894	5,598	895	140	409
37	ND	Renville Co	0	0	0	0	0	0	2,627	992	5,270	875	102	390
38	ND	Richland Co	703	390	55.5	20.2	149	3	11,983	3,239	11,698	1,906	573	1,563
39	ND	Rolette Co	0	0	0	0	0	0	7,942	1,194	7,948	1,179	182	953
40	ND	Sargent Co	0	0	0	0	0	0	3,262	981	7,487	1,190	287	493
41	ND	Sheridan Co	0	0	0	0	0	0	1,893	626	3,952	655	69.2	386
42	ND	Sioux Co	0	0	0	0	0	0	2,362	355	2,875	362	55.5	328
43	ND	Slope Co	0	0	0	0	0	0	1,314	633	1,944	352	55.2	351
44	ND	Stark Co	60.5	180	0	0	0.3	17.5	11,710	3,396	6,239	1,019	399	1,471
45	ND	Steele Co	0	0	0	0	0	0	2,078	1,005	5,764	942	107	332
46	ND	Suitsman Co	0	0	0	0	0	0	185	12,048	4,131	11,090	1,852	380
47	ND	Towner Co	0	0	0	0	0	0	2,607	826	7,985	1,273	115	378
48	ND	Trail Co	684	446	126	53.1	479	15.5	7,800	1,855	10,296	1,603	167	845
49	ND	Walsh Co	0	0	0	0	0	0	8,114	1,892	9,819	1,555	291	1,006
50	ND	Ward Co	0	0	0	0	0	0	17,079	4,279	14,872	2,366	561	2,399
51	ND	Wells Co	0	0	0	0	0	0	3,959	1,943	9,669	1,546	187	549
52	ND	Williams Co	527	2,313	25.1	25.1	1,605	45.4	8,645	2,542	8,750	1,420	269	1,364
Grand Total			11,017	85,873	9,063	7,583	155,982	2,029	284,181	81,289	346,273	55,633	9,878	39,932

CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
22,947	3,786	12,711	2,034	1,381	2,952

Grand Forks Co

SOURCE:
<http://www.epa.gov/air/data/geosol.html>
 USEPA - AirData NET Tier Report
 *Net Air pollution sources (area and point) in tons per year (2002)
 Site visited on 9 December 2009.

State of North Dakota Air Quality Control Region 172 (40 CFR 81.335)

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Summary	Summarizes total emissions by calendar year for Demolish Hangars 520, 521, 522, and 523
Combustion	Estimates emissions from non-road equipment exhaust.
Fugitive	Estimates particulate emissions from construction activities including earthmoving, vehicle traffic, and windblown dust.
Grading	Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions.
Construction Commuter	Estimates emissions for construction workers commuting to the site.
AQCR Tier Report	Summarizes total emissions for the State of North Dakota Air Quality Control Region 172 Tier report for 2002, to be used to compare the project to regional emissions.

Air Quality Emissions from Demolish Hangars 520, 521, 522, and 523

	NO _x (ton)	VOC (ton)	CO (ton)	SO ₂ (ton)	PM ₁₀ (ton)	PM _{2.5} (ton)	CO ₂ (ton)
Construction Combustion	2.184	0.130	0.863	0.044	0.132	0.128	254,361
Construction Fugitive Dust	-	-	-	-	1.792	0.090	-
Construction Commuter	0.064	0.064	0.578	0.001	0.006	0.004	76,698
TOTAL	2.248	0.194	1.442	0.044	1.930	0.222	331,059

Note: Total CY2010 PM_{10/2.5} fugitive dust emissions are assuming USEPA 50% control efficiencies.

CO₂ emissions converted to metric tons = **300,271 metric tons**
 State of North Dakota's CO₂ emissions = **53,550,515 metric tons (DOE/EIA 2005)**
 Percent of North Dakota's CO₂ emissions = **0.001% metric tons**

Source: U.S. Department of Energy (DOE)/Energy Information Administration (EIA). 2005. State Carbon Dioxide Emissions Summary for the State of North Dakota. Available online: <http://www.eia.doe.gov/oi/af/1605/state/state_emissions.html>. Accessed 9 December 2009

Since future year budgets were not readily available, actual 2002 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

State of North Dakota Air Quality Control Region 172

Year	Point and Area Sources Combined					
	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)
2002	167,162	41,961	295,198	165,860	355,336	63,216

Source: USEPA-AirData NET Tier Report (<http://www.epa.gov/air/data/geosel.html>). Site visited on 9 December 2009.

Air Emissions from Demolish Hangars 520, 521, 522, and 523 Determination Significance (Significance Threshold = 10% of regional)

Point and Area Sources Combined					
NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)
167,162	41,961	295,198	165,860	355,336	63,216
2.25	0.19	1.44	0.04	1.93	0.22
0.001%	0.0005%	0.0005%	0.00003%	0.001%	0.0004%

Regional Emissions
 Emissions
 % of Regional

Combustion Emissions

Combustion Emissions of VOC, NO_x, SO₂, CO, PM_{2.5}, PM₁₀, and CO₂ due to Construction

General Construction Activities

Area Disturbed

Demolish Hangars 520, 521, 522, and 523

117,359 ft²

Total General Construction Area:
Total Demolition Area:
Total Pavement Area:
Total Disturbed Area:
Construction Duration:
Annual Construction Activity:

0 ft²
0.000 acres
117,359 ft²
2.7 acres
0.000 ft²
0.000 acres
117,359 ft²
2.7 acres
7 months
140 days/yr

Assume 7 months, 4 weeks per month, 5 days per week.

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Bulldozer	1	13.60	0.96	5.50	1.02	0.89	0.87	1456.90
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64	1141.65
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47	4941.53

Paving

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34	401.93
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42	536.07
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93	4685.95
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69	5623.96

Demolition

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90	1360.10
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87	3703.07

Building Construction

Equipment ^d	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Stationary								
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22	213.06
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31	291.92
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22	112.39
Mobile (non-road)								
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54	572.24
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49	931.93
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74	4464.51

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77
Total per 10 acres of activity	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77

- The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
- The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO₂ emissions by more than a factor of two.
- Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO _x	VOC	CO	SO ₂ **	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469	4941.526
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693	5623.957
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865	3703.074
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744	4464.512
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.251	0.309	0.300	359.773
Architectural Coating**			0.000					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO_x = (Total Grading NO_x per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft ²)	Total Area (acres)	Total Days
Grading:	117,359	2.69	2
Paving:	0	0.00	0
Demolition:	117,359	2.69	135
Building Construction:	0	0.00	0
Architectural Coating	0	0.00	0

(from "Grading" worksheet)

(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	83.28	5.15	31.42	1.67	5.09	4.94	9,883
Paving	-	-	-	-	-	-	0
Demolition	4,284.79	254.00	1,695.15	85.70	259.07	251.30	498,840
Building Construction	-	-	-	-	-	-	0
Architectural Coatings	-	-	-	-	-	-	0
Total Emissions (lbs):	4,368.07	259.15	1,726.57	87.36	264.16	256.24	508,723

Results: Total Project Annual Emission Rates

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Total Project Emissions (lbs)	4,368.07	259.15	1,726.57	87.36	264.16	256.24	508,723
Total Project Emissions (tons)	2.18	0.13	0.86	0.04	0.13	0.13	254.36

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006

PM_{2.5} Emissions

PM_{2.5} Multiplier 0.10 (10% of PM₁₀ emissions assumed to be PM_{2.5}) EPA 2001; EPA 2006

Control Efficiency

0.50 (assume 50% control efficiency for PM₁₀ and PM_{2.5} emissions) EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM₁₀/acre-month)

Duration of Construction Project - months
Area - acres

General Construction Activities (0.19 ton PM₁₀/acre-month)

Duration of Construction Project 7 months
Area 2.7 acres

Project Emissions (tons/year)			
	PM₁₀ uncontrolled	PM₁₀ controlled	PM_{2.5} controlled
New Roadway Construction	0.00	0.00	0.00
General Construction Activities	3.58	1.79	0.09
Total	3.58	1.79	0.09

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10} /acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10} /acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10} /acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10} /acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10} /acre-month) and 75% of the average emission factor (0.11 ton PM_{10} /acre-month). The 0.19 ton PM_{10} /acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10} /acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP), which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10} /acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10} /acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM_{10} /acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999*. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Grading Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 2.7 acres/yr (from Combustion Worksheet)
Qty Equipment: 3.0 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project- specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	2.69	0.34
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	2.69	1.32
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	1.35	1.36
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	1.35	0.56
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	2.69	0.94
TOTAL								4.51

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 4.51
Qty Equipment: 3.00
Grading days/yr: 1.50

Construction Commuter Emissions

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>.

Assumptions:

Passenger vehicle emission factors for scenario year 2010 are used

The average roundtrip commute for a construction worker = 40 miles

Number of construction days = 140 days

Number of construction workers (daily) = 25 people

Passenger Vehicle Emission Factors for Year 2010 (lbs/mile)

NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
0.00091814	0.00091399	0.00826276	0.00001077	0.00008698	0.00005478	1.09568235

updated April 24, 2008. Available online: <<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>>. Accessed 27 May 2009.

Notes:

The SMAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC

Construction Commuter Emissions

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	128.540	127.958	1156.786	1.508	12.177	7.669	153395.529
tons	0.064	0.064	0.578	0.0008	0.0061	0.0038	76.698

Example Calculation: NO_x emissions (lbs) = 60 miles/day * NO_x emission factor (lb/mile) * number of construction days * number of workers

State of North Dakota Air Quality Control Region 172

Row #	State	County	Point Source Emissions					Area Source Emissions (Non-Point and Mobile Sources)						
			CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
1	ND	Adams Co	0	0	0	0	0	0	1,799	533	4,911	763	57.3	308
2	ND	Barnes Co	0	0	0	0	0	0	7,832	3,740	9,687	1,605	355	949
3	ND	Benson Co	0	0	0	0	0	0	4,941	1,130	7,364	1,173	145	700
4	ND	Billings Co	34.9	41.7	3.11	3.11	283	3.5	2,588	1,365	1,421	276	89.9	430
5	ND	Bottineau Co	0	0	0	0	0	0	5,583	1,559	7,809	1,315	179	723
6	ND	Bowman Co	0	0	0	0	0	0	2,250	738	2,716	447	73	390
7	ND	Burke Co	57.3	181	0.71	0.6	426	5.2	2,375	885	5,894	960	97.3	386
8	ND	Burling Co	0	0	0	0	0	0	22,345	4,560	10,005	1,495	713	3,001
9	ND	Cavalier Co	0	0	0	0	0	0	4,094	1,489	11,343	1,810	166	547
10	ND	Dickey Co	0	0	0	0	0	0	4,045	940	7,102	1,117	120	607
11	ND	Divide Co	0	0	0	0	0	0	2,457	888	5,056	844	104	394
12	ND	Dunn Co	96.8	100	0.84	0.51	5.3	13	2,845	737	4,129	676	93.7	438
13	ND	Edley Co	0	0	0	0	0	0	2,038	1,125	3,357	558	91.7	328
14	ND	Emmons Co	0	0	0	0	0	0	2,911	652	5,232	822	84.8	414
15	ND	Foster Co	0	0	0	0	0	0	2,738	1,417	5,335	859	119	394
16	ND	Golden Valley Co	0	0	0	0	0	0	2,762	2,067	2,572	470	152	392
17	ND	Grand Forks Co	144	229	26.3	3.74	641	1.4	22,803	3,557	12,685	2,030	740	2,951
18	ND	Grant Co	0	0	0	0	0	0	2,188	550	5,993	946	59.6	380
19	ND	Griggs Co	0	0	0	0	0	0	2,210	1,263	4,956	805	128	369
20	ND	Hettinger Co	0	0	0	0	0	0	2,321	798	4,880	801	81.6	335
21	ND	Kidder Co	0	0	0	0	0	0	4,762	2,178	4,930	824	153	672
22	ND	LaMoure Co	0	0	0	0	0	0	3,540	1,113	7,937	1,269	146	498
23	ND	Logan Co	0	0	0	0	0	0	1,833	451	3,177	520	57.4	300
24	ND	McHenry Co	0.9	47	54.6	23.7	0.2	107	4,474	2,296	6,810	1,123	214	668
25	ND	McIntosh Co	95.9	105	0.9	0.55	6	12.8	2,497	598	4,067	647	86.4	355
26	ND	McKenzie Co	205	578	3.49	3.31	213	13	4,474	964	6,060	961	103	688
27	ND	McLean Co	1,908	10,357	2,911	2,349	24,428	153	7,588	1,734	11,053	1,748	179	1,206
28	ND	Mercer Co	3,974	45,350	3,334	2,904	91,671	568	5,111	768	3,341	576	96.4	1,085
29	ND	Morton Co	752	1,883	882	826	6,833	182	13,145	3,141	8,295	1,305	339	1,463
30	ND	Mountrail Co	0	0	0	0	0	0	5,348	1,897	6,831	1,113	195	803
31	ND	Nelson Co	0	0	0	0	0	0	2,670	752	6,055	949	89.6	381
32	ND	Oliver Co	1,100	22,845	1,390	1,256	28,565	241	1,717	374	2,573	425	46.1	271
33	ND	Pembina Co	588	758	193	78.7	730	145	8,051	1,889	8,196	1,264	275	817
34	ND	Pierce Co	0	0	0	0	0	0	2,344	1,110	5,630	924	138	570
35	ND	Ramsey Co	0	0	0	0	0	0	5,281	1,248	7,615	1,223	170	823
36	ND	Ransom Co	106	69	56.1	35.4	1.5	298	2,798	894	5,598	895	140	409
37	ND	Renville Co	0	0	0	0	0	0	2,627	992	5,270	875	102	390
38	ND	Richland Co	703	390	55.5	20.2	149	3	11,983	3,239	11,698	1,906	573	1,563
39	ND	Rolette Co	0	0	0	0	0	0	7,942	1,194	7,948	1,179	182	953
40	ND	Sargent Co	0	0	0	0	0	0	3,262	981	7,487	1,190	287	493
41	ND	Sheridan Co	0	0	0	0	0	0	1,893	626	3,952	655	69.2	386
42	ND	Sioux Co	0	0	0	0	0	0	2,362	355	2,875	362	55.5	328
43	ND	Slope Co	0	0	0	0	0	0	1,314	633	1,944	352	55.2	351
44	ND	Stark Co	60.5	180	0	0	0.3	17.5	11,710	3,396	6,239	1,019	399	1,471
45	ND	Steele Co	0	0	0	0	0	0	2,078	1,005	5,764	942	107	332
46	ND	Suitsman Co	0	0	0	0	0	0	12,048	4,131	11,090	1,852	380	1,679
47	ND	Towner Co	0	0	0	0	0	0	2,607	826	7,985	1,273	115	378
48	ND	Trail Co	684	446	126	53.1	479	15.5	7,600	1,855	10,296	1,603	167	845
49	ND	Walsh Co	0	0	0	0	0	0	8,114	1,892	9,819	1,555	291	1,006
50	ND	Ward Co	0	0	0	0	0	0	17,079	4,279	14,872	2,366	561	2,399
51	ND	Wells Co	0	0	0	0	0	0	3,959	1,943	9,669	1,546	187	549
52	ND	Williams Co	527	2,313	25.1	25.1	1,605	45.4	8,645	2,542	8,750	1,420	269	1,364
Grand Total			11,017	85,873	9,063	7,583	155,982	2,029	284,181	81,289	346,273	55,633	9,878	39,932

Grand Forks Co

CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
22,947	3,786	12,711	2,034	1,381	2,952

State of North Dakota Air Quality Control Region 172 (40 CFR 81.335)

SOURCE:
<http://www.epa.gov/air/data/geosol.html>
 USEPA - AirData NET Tier Report
 *Net Air pollution sources (area and point) in tons per year (2002)
 Site visited on 9 December 2009.

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Summary	Summarizes total emissions by calendar year for Construct Consolidated Security Forces
Combustion	Estimates emissions from non-road equipment exhaust.
Fugitive	Estimates particulate emissions from construction activities including earthmoving, vehicle traffic, and windblown dust.
Grading	Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions.
Construction Commuter	Estimates emissions for construction workers commuting to the site.
AQCR Tier Report	Summarizes total emissions for the State of North Dakota Air Quality Control Region 172 Tier report for 2002, to be used to compare the project to regional emissions.

Air Quality Emissions from Construct Consolidated Security Forces

	NO _x (ton)	VOC (ton)	CO (ton)	SO ₂ (ton)	PM ₁₀ (ton)	PM _{2.5} (ton)	CO ₂ (ton)
Construction Combustion	2,708	0.355	1,181	0.196	0.192	0.186	309,130
Construction Fugitive Dust	-	-	-	-	4.562	0.267	-
Construction Commuter	0.055	0.055	0.496	0.001	0.005	0.003	65,741
TOTAL	2,763	0.410	1,677	0.196	4,759	0.456	374,871

Note: Total CY2010 PM_{10/2.5} fugitive dust emissions are assuming USEPA 50% control efficiencies.

CO₂ emissions converted to metric tons = **340,008 metric tons**
 State of North Dakota's CO₂ emissions = **53,550,515 metric tons (DOE/EIA 2005)**
 Percent of North Dakota's CO₂ emissions = **0.001% metric tons**

Source: U.S. Department of Energy (DOE)/Energy Information Administration (EIA). 2005. State Carbon Dioxide Emissions Summary for the State of North Dakota. Available online: <http://www.eia.doe.gov/oi/af/1605/state/state_emissions.html>. Accessed 9 December 2009

Since future year budgets were not readily available, actual 2002 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

State of North Dakota Air Quality Control Region 172

Year	Point and Area Sources Combined				
	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM _{2.5} (tpy)
2002	167,162	41,961	295,198	165,860	355,336
					63,216

Source: USEPA-AirData NET Tier Report (<http://www.epa.gov/air/data/geosel.html>). Site visited on 9 December 2009.

Air Emissions from Construct Consolidated Security Forces Facility Determination Significance (Significance Threshold = 10% of regional)

Point and Area Sources Combined				
NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM _{2.5} (tpy)
167,162	41,961	295,198	165,860	355,336
2.76	0.41	1.68	0.20	4.76
0.002%	0.001%	0.001%	0.0001%	0.001%

Regional Emissions
 Emissions
 % of Regional

Combustion Emissions

Combustion Emissions of VOC, NO_x, SO₂, CO, PM_{2.5}, PM₁₀, and CO₂ due to Construction

General Construction Activities

Area Disturbed

Construct Consolidated Security Forces Facility
Construct Site Improvements
Construct Parking Lot

31,861 ft²
257,796 ft²
79,997 ft²

Total General Construction Area:

31,861 ft²
0.7 acres

Total Demolition Area:

0 ft²
0.0 acres

Total Pavement Area:

79,997 ft²

Total Disturbed Area:

1.8 acres
369,654 ft²
8.5 acres

Construction Duration:

6 months

Annual Construction Activity:

120 days/yr

Assume 6 months, 4 weeks per month, 5 days per week.

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Bulldozer	1	13.60	95.742%	5.50	1.02	0.89	0.87	1456.90
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64	1141.65
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47	4941.53

Paving

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34	401.93
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42	536.07
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93	4685.95
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69	5623.96

Demolition

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90	1360.10
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87	3703.07

Building Construction

Equipment ^d	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Stationary								
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22	213.06
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31	291.92
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22	112.39
Mobile (non-road)								
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54	572.24
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49	931.93
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74	4464.51

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77
Total per 10 acres of activity	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77

- The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
- The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO₂ emissions by more than a factor of two.
- Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO _x	VOC	CO	SO ₂ **	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469	4941.526
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693	5623.957
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865	3703.074
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744	4464.512
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.251	0.309	0.300	359.773
Architectural Coating**			14.547					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO_x = (Total Grading NO_x per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft ²)	Total Area (acres)	Total Days
Grading:	369,654	8.49	5
Paving:	79,997	1.84	9
Demolition:	0	0.00	0
Building Construction:	31,861	0.73	120
Architectural Coating	31,861	0.73	20

(from "Grading" worksheet)

(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	208.21	12.88	78.55	4.16	12.73	12.35	24,708
Paving	408.31	23.45	167.21	8.17	24.98	24.24	50,616
Demolition	-	-	-	-	-	-	0
Building Construction	4,727.56	375.58	2,085.88	373.96	339.49	329.30	535,741
Architectural Coatings	71.48	298.41	31.31	5.02	6.19	6.00	7,195
Total Emissions (lbs):	5,415.55	710.33	2,362.94	391.31	383.38	371.88	618,260

Results: Total Project Annual Emission Rates

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Total Project Emissions (lbs)	5,415.55	710.33	2,362.94	391.31	383.38	371.88	618,260
Total Project Emissions (tons)	2.71	0.36	1.18	0.20	0.19	0.19	309.13

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006

PM_{2.5} Emissions

PM_{2.5} Multiplier 0.10 (10% of PM₁₀ emissions assumed to be PM_{2.5}) EPA 2001; EPA 2006

Control Efficiency

0.50 (assume 50% control efficiency for PM₁₀ and PM_{2.5} emissions) EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM₁₀/acre-month)

Duration of Construction Project 2 months
Area 1.8 acres

General Construction Activities (0.19 ton PM₁₀/acre-month)

Duration of Construction Project 6 months
Area 6.6 acres

	Project Emissions (tons/year)			
	PM ₁₀ uncontrolled	PM ₁₀ controlled	PM _{2.5} uncontrolled	PM _{2.5} controlled
New Roadway Construction	1.54	0.77	0.15	0.08
General Construction Activities	7.58	3.79	0.38	0.19
Total	9.12	4.56	0.53	0.27

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10} /acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10} /acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10} /acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10} /acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10} /acre-month) and 75% of the average emission factor (0.11 ton PM_{10} /acre-month). The 0.19 ton PM_{10} /acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10} /acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP), which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10} /acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10} /acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM_{10} /acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999*. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.
EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.
MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Grading Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 8.5 acres/yr (from Combustion Worksheet)
Qty Equipment: 3.0 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day	equip-days per acre	Acres/yr (project- specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	8.49	1.06
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	8.49	4.15
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	4.24	4.28
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	4.24	1.76
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	8.49	2.98
TOTAL								14.22

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 14.22
Qty Equipment: 3.00
Grading days/yr: 4.74

Construction Commuter Emissions

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>.

Assumptions:

Passenger vehicle emission factors for scenario year 2010 are used

The average roundtrip commute for a construction worker = 40 miles

Number of construction days = 120 days

Number of construction workers (daily) = 25 people

Passenger Vehicle Emission Factors for Year 2010 (lbs/mile)

NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
0.00091814	0.00091399	0.00826276	0.00001077	0.00008698	0.00005478	1.09568235

updated April 24, 2008. Available online: <<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>>. Accessed 27 May 2009.

Notes:

The SMAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC

Construction Commuter Emissions

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	110.177	109.679	991.531	1.293	10.437	6.574	131481.882
tons	0.055	0.055	0.496	0.0006	0.0052	0.0033	65.741

Example Calculation: NO_x emissions (lbs) = 60 miles/day * NO_x emission factor (lb/mile) * number of construction days * number of workers

State of North Dakota Air Quality Control Region 172

Row #	State	County	Point Source Emissions					Area Source Emissions (Non-Point and Mobile Sources)						
			CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
1	ND	Adams Co	0	0	0	0	0	0	1.799	533	4.911	763	57.3	308
2	ND	Barnes Co	0	0	0	0	0	0	7.832	3,740	9.687	1,605	355	949
3	ND	Benson Co	0	0	0	0	0	0	4.941	1,130	7.364	1,173	145	700
4	ND	Billings Co	34.9	41.7	3.11	3.11	283	3.5	2.568	1,365	1,421	276	89.9	430
5	ND	Buttineau Co	0	0	0	0	0	0	5.583	1,559	7.809	1,315	179	723
6	ND	Bowman Co	0	0	0	0	0	0	2.250	738	2.716	447	73	390
7	ND	Burke Co	57.3	181	0.71	0.6	426	5.2	2.375	885	5.884	960	97.3	386
8	ND	Burligh Co	0	0	0	0	0	0	22.345	4,560	10,005	1,495	713	3,001
9	ND	Cavalier Co	0	0	0	0	0	0	4.094	1,489	11,343	1,810	166	547
10	ND	Dickey Co	0	0	0	0	0	0	4.045	940	7.102	1,117	120	607
11	ND	Divide Co	0	0	0	0	0	0	2.457	888	5.056	844	104	394
12	ND	Dunn Co	96.8	100	0.84	0.51	53	13	2.845	737	4.129	676	93.7	438
13	ND	Edley Co	0	0	0	0	0	0	2.038	1,125	3.357	558	91.7	328
14	ND	Emmons Co	0	0	0	0	0	0	2.911	652	5.232	822	84.8	414
15	ND	Foster Co	0	0	0	0	0	0	2.738	1,417	5.335	859	119	394
16	ND	Golden Valley Co	0	0	0	0	0	0	2.762	2,067	2.572	470	152	392
17	ND	Grand Forks Co	144	229	26.3	3.74	641	1.4	22.803	3,557	12,685	2,030	740	2,951
18	ND	Grant Co	0	0	0	0	0	0	2.188	550	5.993	946	59.6	380
19	ND	Griggs Co	0	0	0	0	0	0	2.210	1,263	4.956	805	128	369
20	ND	Hettinger Co	0	0	0	0	0	0	2.321	798	4.880	801	81.6	335
21	ND	Kidder Co	0	0	0	0	0	0	4.762	2,178	4.930	824	153	672
22	ND	LaMoure Co	0	0	0	0	0	0	3.540	1,113	7.937	1,269	146	498
23	ND	Logan Co	0	0	0	0	0	0	1.833	451	3.177	520	57.4	300
24	ND	McHenry Co	0.9	47	54.6	23.7	0.2	107	4.474	2,296	6.810	1,123	214	668
25	ND	McIntosh Co	95.9	105	0.9	0.55	6	12.8	2.497	598	4.067	647	86.4	355
26	ND	McKenzie Co	205	578	3.49	3.31	213	13	4.474	964	6.060	961	103	688
27	ND	McLean Co	1,908	10,357	2,911	2,349	24,428	153	7.588	1,734	11,053	1,748	179	1,206
28	ND	Mercer Co	3,974	45,350	3,334	2,904	91,617	598	5,111	768	3,341	576	96.4	1,085
29	ND	Morton Co	752	1,883	882	826	6,833	182	13,145	3,141	8,295	1,305	339	1,463
30	ND	Mountrail Co	0	0	0	0	0	0	5.348	1,897	6.831	1,113	195	803
31	ND	Nelson Co	0	0	0	0	0	0	2.670	752	6.055	949	89.6	381
32	ND	Oliver Co	1,100	22,845	1,390	1,256	28,565	241	1,717	374	2,573	425	46.1	271
33	ND	Pembina Co	588	758	193	78.7	730	145	8,051	1,889	8,196	1,264	275	817
34	ND	Pierce Co	0	0	0	0	0	0	2.344	1,110	5.630	924	138	570
35	ND	Ramsey Co	0	0	0	0	0	0	5.281	1,248	7.615	1,223	170	823
36	ND	Ransom Co	106	69	56.1	35.4	1.5	298	2,798	894	5,598	895	140	409
37	ND	Renville Co	0	0	0	0	0	0	2.627	992	5,270	875	102	390
38	ND	Richland Co	703	390	55.5	20.2	149	3	11,963	3,239	11,698	1,906	573	1,563
39	ND	Rolette Co	0	0	0	0	0	0	7.942	1,194	7,948	1,179	182	953
40	ND	Sargent Co	0	0	0	0	0	0	3.262	981	7,487	1,190	287	493
41	ND	Sheridan Co	0	0	0	0	0	0	1.893	626	3,952	655	69.2	386
42	ND	Sioux Co	0	0	0	0	0	0	2.362	355	2,875	362	55.5	328
43	ND	Slope Co	0	0	0	0	0	0	1.314	633	1,944	352	55.2	351
44	ND	Stark Co	60.5	180	0	0	0.3	17.5	11,710	3,396	6,239	1,019	399	1,471
45	ND	Steele Co	0	0	0	0	0	0	2.078	1,005	5,764	942	107	332
46	ND	Suivan Co	0	0	0	0	0	0	12,048	4,131	11,090	1,852	380	1,679
47	ND	Towner Co	0	0	0	0	0	0	2.607	826	7,985	1,273	115	378
48	ND	Trail Co	684	446	126	53.1	479	15.5	7,800	1,855	10,296	1,603	167	845
49	ND	Walsh Co	0	0	0	0	0	0	8.114	1,892	9,819	1,555	291	1,006
50	ND	Ward Co	0	0	0	0	0	0	17,079	4,279	14,872	2,366	561	2,399
51	ND	Wells Co	0	0	0	0	0	0	3,959	1,943	9,669	1,546	187	549
52	ND	Williams Co	527	2,313	25.1	25.1	1,605	45.4	8,645	2,542	8,750	1,420	269	1,364
Grand Total			11,017	85,873	9,063	7,583	155,982	2,029	284,181	81,289	346,273	55,633	9,878	39,932

SOURCE:
<http://www.epa.gov/air/data/geossl.html>
 USEPA - AirData NET Tier Report
 *Net Air pollution sources (area and point) in tons per year (2002)
 Site visited on 9 December 2009.

State of North Dakota Air Quality Control Region 172 (40 CFR 81.335)

CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
22,947	3,786	12,711	2,034	1,381	2,952

Grand Forks Co

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Summary	Summarizes total emissions by calendar year for Construct BCE Pavements and Maintenance Facility/Snow Barn
Combustion	Estimates emissions from non-road equipment exhaust.
Fugitive	Estimates particulate emissions from construction activities including earthmoving, vehicle traffic, and windblown dust.
Grading	Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions.
Construction Commuter	Estimates emissions for construction workers commuting to the site.
AQCR Tier Report	Summarizes total emissions for the State of North Dakota Air Quality Control Region 172 Tier report for 2002, to be used to compare the project to regional emissions.

Air Quality Emissions from Construct BCE Pavements and Maintenance Facility/Snow Barn

	NO _x (ton)	VOC (ton)	CO (ton)	SO ₂ (ton)	PM ₁₀ (ton)	PM _{2.5} (ton)	CO ₂ (ton)
Construction Combustion	2.689	0.381	1.175	0.195	0.191	0.185	307.001
Construction Fugitive Dust	-	-	-	-	2.476	0.165	-
Construction Commuter	0.055	0.055	0.496	0.001	0.005	0.003	65.741
TOTAL	2.744	0.436	1.671	0.196	2.671	0.353	372.741

Note: Total CY2010 PM_{10/2.5} fugitive dust emissions are assuming USEPA 50% control efficiencies.

CO₂ emissions converted to metric tons = **338,076 metric tons**
State of North Dakota's CO₂ emissions = **53,550,515 metric tons (DOE/EIA 2005)**
Percent of North Dakota's CO₂ emissions = **0.001% metric tons**

Source: U.S. Department of Energy (DOE)/Energy Information Administration (EIA). 2005. State Carbon Dioxide Emissions Summary for the State of North Dakota. Available online: <http://www.eia.doe.gov/oiaf/1605/state/state_emissions.html>. Accessed 9 December 2009

Since future year budgets were not readily available, actual 2002 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

State of North Dakota Air Quality Control Region 172

Year	Point and Area Sources Combined					
	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)
2002	167,162	41,961	295,198	165,860	355,336	63,216

Source: USEPA-AirData NET Tier Report (<http://www.epa.gov/air/data/geosel.html>). Site visited on 9 December 2009.

Air Emissions from Construct BCE Pavements and Maintenance Facility/Snow Barn
Determination Significance (Significance Threshold = 10% of regional)

Point and Area Sources Combined					
NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)
167,162	41,961	295,198	165,860	355,336	63,216
2.74	0.44	1.67	0.20	2.67	0.35
0.002%	0.001%	0.001%	0.0001%	0.001%	0.001%

Regional Emissions
Emissions
% of Regional

Combustion Emissions

Combustion Emissions of VOC, NO_x, SO₂, CO, PM_{2.5}, PM₁₀, and CO₂ due to Construction

General Construction Activities

Area Disturbed

Construct BCE Pavements and Maintenance Facility/Snow Barn
Construct Site Improvements
Construct Parking Lot

45,003 ft²
80,729 ft²
86,111 ft²

Total General Construction Area:

45,003 ft²
1.0 acres

Total Demolition Area:

0 ft²
0.0 acres

Total Pavement Area:

86,111 ft²
2.0 acres

Total Disturbed Area:

211,843 ft²
4.9 acres

Construction Duration:

6 months

Annual Construction Activity:

120 days/yr

Assume 6 months, 4 weeks per month, 5 days per week.

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Bulldozer	1	13.60	95.742%	5.50	1.02	0.89	0.87	1456.90
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64	1141.65
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47	4941.53

Paving

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34	401.93
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42	536.07
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93	4685.95
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69	5623.96

Demolition

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90	1360.10
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87	3703.07

Building Construction

Equipment ^d	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Stationary								
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22	213.06
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31	291.92
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22	112.39
Mobile (non-road)								
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54	572.24
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49	931.93
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74	4464.51

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77
Total per 10 acres of activity	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77

- The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
- The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO₂ emissions by more than a factor of two.
- Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO _x	VOC	CO	SO ₂ **	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469	4941.526
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693	5623.957
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865	3703.074
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744	4464.512
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.251	0.309	0.300	359.773
Architectural Coating**			17.289					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO_x = (Total Grading NO_x per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft ²)	Total Area (acres)	Total Days
Grading:	211,843	4.86	3
Paving:	86,111	1.98	10
Demolition:	0	0.00	0
Building Construction:	45,003	1.03	120
Architectural Coating	45,003	1.03	20

(from "Grading" worksheet)

(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	124.92	7.73	47.13	2.50	7.64	7.41	14,825
Paving	453.67	26.06	185.78	9.07	27.76	26.93	56,240
Demolition	-	-	-	-	-	-	0
Building Construction	4,727.56	375.58	2,085.88	373.96	339.49	329.30	535,741
Architectural Coatings	71.48	353.25	31.31	5.02	6.19	6.00	7,195
Total Emissions (lbs):	5,377.64	762.62	2,350.10	390.56	381.07	369.64	614,001

Results: Total Project Annual Emission Rates

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Total Project Emissions (lbs)	5,377.64	762.62	2,350.10	390.56	381.07	369.64	614,001
Total Project Emissions (tons)	2.69	0.38	1.18	0.20	0.19	0.18	307.00

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006

PM_{2.5} Emissions

PM_{2.5} Multiplier 0.10 (10% of PM₁₀ emissions assumed to be PM_{2.5}) EPA 2001; EPA 2006

Control Efficiency

0.50 (assume 50% control efficiency for PM₁₀ and PM_{2.5} emissions) EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM₁₀/acre-month)

Duration of Construction Project 2 months
Area 2.0 acres

General Construction Activities (0.19 ton PM₁₀/acre-month)

Duration of Construction Project 6 months
Area 2.9 acres

Project Emissions (tons/year)			
	PM₁₀ uncontrolled	PM₁₀ controlled	PM_{2.5} controlled
New Roadway Construction	1.66	0.83	0.17
General Construction Activities	3.29	1.65	0.16
Total	4.95	2.48	0.33
			0.17

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM₁₀/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM₁₀/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM₁₀/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM₁₀/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM₁₀/acre-month) and 75% of the average emission factor (0.11 ton PM₁₀/acre-month). The 0.19 ton PM₁₀/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM₁₀/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP), which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM₁₀ and PM_{2.5} in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM₁₀/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM₁₀/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM₁₀/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

PM_{2.5} Multiplier

PM_{2.5} emissions are estimated by applying a particle size multiplier of 0.10 to PM₁₀ emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM₁₀ and PM_{2.5}

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM₁₀ and PM_{2.5} in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999*. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.
EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.
MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Grading Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 4.9 acres/yr (from Combustion Worksheet)
Qty Equipment: 3.0 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day	equip-days per acre	Acres/yr (project- specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	4.86	0.61
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	4.86	2.38
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	2.43	2.45
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	2.43	1.01
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	4.86	1.71
TOTAL								8.15

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 8.15
Qty Equipment: 3.00
Grading days/yr: 2.72

Construction Commuter Emissions

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>.

Assumptions:

Passenger vehicle emission factors for scenario year 2010 are used

The average roundtrip commute for a construction worker = 40 miles

Number of construction days = 120 days

Number of construction workers (daily) = 25 people

Passenger Vehicle Emission Factors for Year 2010 (lbs/mile)

NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
0.00091814	0.00091399	0.00826276	0.00001077	0.00008698	0.00005478	1.09568235

updated April 24, 2008. Available online: <<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>>. Accessed 27 May 2009.

Notes:

The SMAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC

Construction Commuter Emissions

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	110.177	109.679	991.531	1.293	10.437	6.574	131481.882
tons	0.055	0.055	0.496	0.0006	0.0052	0.0033	65.741

Example Calculation: NO_x emissions (lbs) = 60 miles/day * NO_x emission factor (lb/mile) * number of construction days * number of workers

State of North Dakota Air Quality Control Region 172

Row #	State	County	Point Source Emissions					Area Source Emissions (Non-Point and Mobile Sources)						
			CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
1	ND	Adams Co	0	0	0	0	0	0	1.799	533	4.911	763	57.3	308
2	ND	Barnes Co	0	0	0	0	0	0	7.832	3,740	9,687	1,605	355	949
3	ND	Benson Co	0	0	0	0	0	0	4.941	1,130	7,364	1,173	145	700
4	ND	Billings Co	34.9	41.7	3.11	3.11	283	3.5	2.568	1,365	1,421	276	89.9	430
5	ND	Buttineau Co	0	0	0	0	0	0	5.583	1,559	7,809	1,315	179	723
6	ND	Bowman Co	0	0	0	0	0	0	2.250	738	2,716	447	73	390
7	ND	Burke Co	57.3	181	0.71	0.6	426	5.2	2.375	885	5,884	960	97.3	386
8	ND	Burligh Co	0	0	0	0	0	0	22.345	4,560	10,005	1,495	713	3,001
9	ND	Cavalier Co	0	0	0	0	0	0	4.094	1,489	11,343	1,810	166	547
10	ND	Dickey Co	0	0	0	0	0	0	4.045	940	7,102	1,117	120	607
11	ND	Divide Co	0	0	0	0	0	0	2.457	888	5,056	844	104	394
12	ND	Dunn Co	96.8	100	0.84	0.51	53	13	2.845	737	4,129	676	93.7	438
13	ND	Eddy Co	0	0	0	0	0	0	2.038	1,125	3,357	558	91.7	328
14	ND	Emmons Co	0	0	0	0	0	0	2.911	652	5,232	822	84.8	414
15	ND	Foster Co	0	0	0	0	0	0	2.738	1,417	5,335	859	119	394
16	ND	Golden Valley Co	0	0	0	0	0	0	2.762	2,067	2,572	470	152	392
17	ND	Grand Forks Co	144	229	26.3	3.74	641	1.4	22.803	3,557	12,685	2,030	740	2,951
18	ND	Grant Co	0	0	0	0	0	0	2.188	550	5,993	946	59.6	380
19	ND	Griggs Co	0	0	0	0	0	0	2.210	1,263	4,956	805	128	369
20	ND	Hettinger Co	0	0	0	0	0	0	2.321	798	4,880	801	81.6	335
21	ND	Kidder Co	0	0	0	0	0	0	4.762	2,178	4,930	824	153	672
22	ND	LaMoure Co	0	0	0	0	0	0	3.540	1,113	7,937	1,269	146	498
23	ND	Logan Co	0	0	0	0	0	0	1.833	451	3,177	520	57.4	300
24	ND	McHenry Co	0.9	47	54.6	23.7	0.2	107	4.474	2,296	6,810	1,123	214	668
25	ND	McIntosh Co	95.9	105	0.9	0.55	6	12.8	2,497	598	4,067	647	86.4	355
26	ND	McKenzie Co	205	578	3.49	3.31	213	13	4.474	964	6,060	961	103	888
27	ND	McLean Co	1,908	10,357	2,911	2,349	24,428	153	7,588	1,734	11,053	1,748	179	1,206
28	ND	Mercer Co	3,974	45,350	3,334	2,904	91,617	598	5,111	768	3,341	576	96.4	1,085
29	ND	Morton Co	752	1,883	882	826	6,833	182	13,145	3,141	8,295	1,305	339	1,463
30	ND	Mountrail Co	0	0	0	0	0	0	5.348	1,897	6,831	1,113	195	803
31	ND	Nelson Co	0	0	0	0	0	0	2.670	752	6,055	949	89.6	381
32	ND	Oliver Co	1,100	22,845	1,390	1,256	28,565	241	1,717	374	2,573	425	46.1	271
33	ND	Pembina Co	588	758	193	78.7	730	145	8,051	1,889	8,196	1,264	275	817
34	ND	Pierce Co	0	0	0	0	0	0	2.344	1,110	5,630	924	138	570
35	ND	Ramsey Co	0	0	0	0	0	0	5.281	1,248	7,615	1,223	170	823
36	ND	Ransom Co	106	69	56.1	35.4	1.5	298	2,798	894	5,598	895	140	409
37	ND	Renville Co	0	0	0	0	0	0	2.627	992	5,270	875	102	390
38	ND	Richland Co	703	390	55.5	20.2	149	3	11.963	3,239	11,698	1,906	573	1,563
39	ND	Rollette Co	0	0	0	0	0	0	7.942	1,194	7,948	1,179	182	953
40	ND	Sargent Co	0	0	0	0	0	0	3.262	981	7,487	1,190	287	493
41	ND	Sheridan Co	0	0	0	0	0	0	1.893	626	3,952	655	69.2	386
42	ND	Sioux Co	0	0	0	0	0	0	2.362	355	2,875	362	55.5	328
43	ND	Slope Co	0	0	0	0	0	0	1.314	633	1,944	352	55.2	351
44	ND	Stark Co	60.5	180	0	0	0.3	17.5	11,710	3,396	6,239	1,019	399	1,471
45	ND	Steele Co	0	0	0	0	0	0	2.078	1,005	5,764	942	107	332
46	ND	Suetsman Co	0	0	0	0	0	0	12.048	4,131	11,090	1,852	380	1,679
47	ND	Towner Co	0	0	0	0	0	0	2.607	826	7,985	1,273	115	378
48	ND	Trail Co	684	446	126	53.1	479	15.5	7,800	1,855	10,296	1,603	167	845
49	ND	Walsh Co	0	0	0	0	0	0	8.114	1,892	9,819	1,555	291	1,006
50	ND	Ward Co	0	0	0	0	0	0	17,079	4,279	14,872	2,366	561	2,399
51	ND	Wells Co	0	0	0	0	0	0	3,959	1,943	9,669	1,546	187	549
52	ND	Williams Co	527	2,313	25.1	25.1	1,605	45.4	8,645	2,542	8,750	1,420	269	1,364
Grand Total			11,017	85,873	9,063	7,583	155,982	2,029	284,181	81,289	346,273	55,633	9,878	39,932

SOURCE:
<http://www.epa.gov/air/data/geossl.html>
 USEPA - AirData NET Tier Report
 *Net Air pollution sources (area and point) in tons per year (2002)
 Site visited on 9 December 2009.

State of North Dakota Air Quality Control Region 172 (40 CFR 81.335)

CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
22,947	3,786	12,711	2,034	1,381	2,952

Grand Forks Co

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Summary	Summarizes total emissions by calendar year for Construct Small Arms Range
Combustion	Estimates emissions from non-road equipment exhaust.
Fugitive	Estimates particulate emissions from construction activities including earthmoving, vehicle traffic, and windblown dust.
Grading	Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions.
Haul Truck On-Road	Estimates emissions from haul and water trucks delivering materials to the job site.
Construction Commuter	Estimates emissions for construction workers commuting to the site.
AQCR Tier Report	Summarizes total emissions for the State of North Dakota Air Quality Control Region 172 Tier report for 2002, to be used to compare the project to regional emissions.

Air Quality Emissions from Construct Small Arms Range

	NO _x (ton)	VOC (ton)	CO (ton)	SO ₂ (ton)	PM ₁₀ (ton)	PM _{2.5} (ton)	CO ₂ (ton)
Construction Combustion	3,932	0.518	1,718	0.290	0.279	0.271	446,326
Construction Fugitive Dust	-	-	-	-	2,552	0.128	-
Haul and Water Trucks	0.144	0.104	0.423	0.011	0.171	0.044	36,430
Construction Commuter	0.083	0.082	0.744	0.001	0.008	0.005	98,611
TOTAL	4,159	0.704	2,885	0.302	3,009	0.448	581,368

Note: Total CY2010 PM_{10/2.5} fugitive dust emissions are assuming USEPA 50% control efficiencies.

CO₂ emissions converted to metric tons = **527,301 metric tons**
 State of North Dakota's CO₂ emissions = **53,550,515 metric tons (DOE/EIA 2005)**
 Percent of North Dakota's CO₂ emissions = **0.001% metric tons**

Source: U.S. Department of Energy (DOE)/Energy Information Administration (EIA). 2005. State Carbon Dioxide Emissions Summary for the State of North Dakota. Available online: <http://www.eia.doe.gov/oiat/1605/state/state_emissions.html>. Accessed 9 December 2009

Since future year budgets were not readily available, actual 2002 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

State of North Dakota Air Quality Control Region 172

Year	Point and Area Sources Combined				
	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM _{2.5} (tpy)
2002	167,162	41,961	295,198	165,860	355,336
					63,216

Source: USEPA-AirData NET Tier Report (<http://www.epa.gov/air/data/geosel.html>). Site visited on 9 December 2009.

Air Emissions from Construct Construct Small Arms Range Determination Significance (Significance Threshold = 10% of regional)

Point and Area Sources Combined				
NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM _{2.5} (tpy)
167,162	41,961	295,198	165,860	355,336
4.16	0.70	2.88	0.30	3.01
0.002%	0.002%	0.001%	0.0002%	0.001%
				0.001%

Regional Emissions
 Emissions
 % of Regional

Combustion Emissions

Combustion Emissions of VOC, NO_x, SO₂, CO, PM_{2.5}, PM₁₀, and CO₂ due to Construction

General Construction Activities

Area Disturbed

- Construct Construct Small Arms Range
- Construct Site Improvements
- Install Gas Line
- Demolish Existing Small Arms Range Facilities
- Demolish Existing Small Arms Range Berms

67,500 ft²
10,764 ft²
9,000 ft²
16,930 ft²
25,800 ft²

Assume 3,000 ft long by 3 ft wide.

- Total General Construction Area:
- Total Demolition Area:
- Total Pavement Area:
- Total Disturbed Area:
- Construction Duration:
- Annual Construction Activity:

67,500 ft²
1.5 acres
16,930 ft²
0.4 acres
0 ft²
0.0 acres
129,994 ft²
3.0 acres
9 months
180 days/yr

Assume 9 months, 4 weeks per month, 5 days per week.

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Bulldozer	1	13.60	95.742%	5.50	1.02	0.89	0.87	1456.90
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64	1141.65
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47	4941.53

Paving

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34	401.93
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42	536.07
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93	4685.95
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69	5623.96

Demolition

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90	1360.10
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87	3703.07

Building Construction

Equipment ^d	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Stationary								
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22	213.06
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31	291.92
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22	112.39
Mobile (non-road)								
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54	572.24
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49	931.93
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74	4464.51

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77
Total per 10 acres of activity	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77

- The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
- The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO₂ emissions by more than a factor of two.
- Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO _x	VOC	CO	SO ₂ **	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	1	41.641	2,577	15,710	0.833	2,546	2,469	4941.526
Paving Equipment	1	45.367	2,606	18,578	0.907	2,776	2,693	5623.957
Demolition Equipment	1	31.808	1,886	12,584	0.636	1,923	1,865	3703.074
Building Construction	1	39.396	3,130	17,382	3.116	2,829	2,744	4464.512
Air Compressor for Architectural Coating	1	3.574	0.373	1,565	0.251	0.309	0.300	359.773
Architectural Coating**			21,174					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO_x = (Total Grading NO_x per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft ²)	Total Area (acres)	Total Days
Grading:	129,994	2.98	2
Paving:	0	0.00	0
Demolition:	16,930	0.39	19
Building Construction:	67,500	1.55	180
Architectural Coating	67,500	1.55	20

(from "Grading" worksheet)

(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	83.28	5.15	31.42	1.67	5.09	4.94	9,883
Paving	-	-	-	-	-	-	0
Demolition	618.12	36.64	244.54	12.36	37.37	36.25	71,962
Building Construction	7,091.34	563.37	3,128.82	560.94	509.23	493.95	803,612
Architectural Coatings	71.48	430.95	31.31	5.02	6.19	6.00	7,195
Total Emissions (lbs):	7,864.22	1,036.11	3,436.08	579.99	557.88	541.14	892,652

Results: Total Project Annual Emission Rates

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Total Project Emissions (lbs)	7,864.22	1,036.11	3,436.08	579.99	557.88	541.14	892,652
Total Project Emissions (tons)	3.93	0.52	1.72	0.29	0.28	0.27	446.33

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006

PM_{2.5} Emissions

PM_{2.5} Multiplier 0.10 (10% of PM₁₀ emissions assumed to be PM_{2.5}) EPA 2001; EPA 2006

Control Efficiency

0.50 (assume 50% control efficiency for PM₁₀ and PM_{2.5} emissions) EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM₁₀/acre-month)

Duration of Construction Project - months
Area - acres

General Construction Activities (0.19 ton PM₁₀/acre-month)

Duration of Construction Project 9 months
Area 3.0 acres

Project Emissions (tons/year)			
	PM ₁₀ uncontrolled	PM ₁₀ controlled	PM _{2.5} controlled
New Roadway Construction	0.00	0.00	0.00
General Construction Activities	5.10	2.55	0.13
Total	5.10	2.55	0.13

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10} /acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10} /acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10} /acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10} /acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10} /acre-month) and 75% of the average emission factor (0.11 ton PM_{10} /acre-month). The 0.19 ton PM_{10} /acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10} /acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP), which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10} /acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10} /acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM_{10} /acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999*. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.
EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.
MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Grading Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 3.0 acres/yr (from Combustion Worksheet)
Qty Equipment: 3.0 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units acre/day	Acres per equip-day	equip-days per acre	Acres/yr (project- specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	2.98	0.37
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	2.98	1.46
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	1.49	1.50
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	1.49	0.62
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	2.98	1.05
TOTAL								5.00

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 5.00
Qty Equipment: 3.00
Grading days/yr: 1.67

Haul and Water Truck Emissions

Emissions from hauling the raw materials for concrete and fill are estimated in this spreadsheet.
Emission Estimation Method: United States Air Force (USAF) Institute for Environment, Safety and Occupational Health Risk Analysis (IERA) Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations (Revised December 2003).

Raw Material Assumptions:

Haul trucks carry 20 cubic yards of material per trip.
The distance from the borrow pit is 5 miles, therefore the haul truck will travel 10 miles roundtrip.
Estimated number of trips required by haul trucks = total amount of material to be brought on installation/20 cubic yards per truck

Total amount of imported materials = 39,256 cubic yards facility [39,256 Yd³]
Number of trucks required = 1,963 heavy duty diesel haul trucks
Miles per trip = 10 miles

(Assume Demolish Berms and import fill/aggregate for constructing

Water Transportation Assumptions:

Water trucks carry 4,000 gallons per truckload.
Approximately 1,823,166 gallons of water will be required during construction.
Approximately 1/8 inch of water would be applied to project area once per day.
The distance from the nearest water source is 0.5 miles, therefore the water truck will travel 1 mile roundtrip.
Estimated number of trips required by water trucks = total gallons of water to be brought to project site/4,000 gallons per truck

Total amount of water needed for construction = 1,823,166 gallons
Number of trucks required = 456 heavy duty diesel haul trucks
Miles per trip = 1 miles

Heavy Duty Diesel Vehicle (HDDV) Average Emission Factors (grams/mile)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
HDDV	6.500	4.7000	19.10	0.512	7.7	2.01	1646

Notes:
Emission factors for all pollutants except CO₂ are from USAF IERA 2003.
Emission factors for PM, PM₁₀, SO_x are from HDDV in Table 4-50 (USAF IERA 2003).
Emission factors for VOC, CO, and NO_x are from Tables 4-41 through 4-43 for the 2010 calendar year, 2000 model year (USAF IERA 2003).
Diesel fuel produces 22,384 pounds of CO₂ per gallon.
It is assumed that the average HDDV has a fuel economy of 6.17 miles per gallon, Table 4-51 (USAF IERA 2003)
CO₂ emission factor = 22.384 lbs CO₂/gallon diesel * gallon diesel/6.17 miles * 453.6 g/lb

HDDV Haul and Water Truck Emissions From Construction Activities

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	287.79	208.10	845.67	22.67	342.25	88.99	72860.72
tons	0.144	0.104	0.423	0.011	0.171	0.044	36.430

Example Calculation: NO_x emissions (lbs) = miles per trip * number of trips * NO_x emission factor (g/mile) * lb/453.6 g

Construction Commuter Emissions

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>.

Assumptions:

Passenger vehicle emission factors for scenario year 2010 are used

The average roundtrip commute for a construction worker = 40 miles

Number of construction days = 180 days

Number of construction workers (daily) = 25 people

Passenger Vehicle Emission Factors for Year 2010 (lbs/mile)

NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
0.00091814	0.00091399	0.00826276	0.00001077	0.00008698	0.00005478	1.09568235

updated April 24, 2008. Available online: <<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>>. Accessed 27 May 2009.

Notes:

The SMAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC

Construction Commuter Emissions

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	165.265	164.518	1487.296	1.939	15.656	9.861	197222.823
tons	0.083	0.082	0.744	0.0010	0.0078	0.0049	98.611

Example Calculation: NO_x emissions (lbs) = 60 miles/day * NO_x emission factor (lb/mile) * number of construction days * number of workers

State of North Dakota Air Quality Control Region 172

Row #	State	County	Point Source Emissions					Area Source Emissions (Non-Point and Mobile Sources)						
			CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
1	ND	Adams Co	0	0	0	0	0	0	1,799	533	4,911	763	57.3	308
2	ND	Barnes Co	0	0	0	0	0	0	7,832	3,740	9,687	1,605	355	949
3	ND	Benson Co	0	0	0	0	0	0	4,941	1,130	7,364	1,173	145	700
4	ND	Billings Co	34.9	41.7	3.11	3.11	283	3.5	2,588	1,365	1,421	276	89.9	430
5	ND	Bottineau Co	0	0	0	0	0	0	5,583	1,559	7,809	1,315	179	723
6	ND	Bowman Co	0	0	0	0	0	0	2,250	738	2,716	447	73	390
7	ND	Burke Co	57.3	181	0.71	0.6	426	5.2	2,375	885	5,894	960	97.3	386
8	ND	Burlingame Co	0	0	0	0	0	0	22,345	4,560	10,005	1,495	713	3,001
9	ND	Cavalier Co	0	0	0	0	0	0	4,094	1,489	11,343	1,810	166	547
10	ND	Dickey Co	0	0	0	0	0	0	4,045	940	7,102	1,117	120	607
11	ND	Divide Co	0	0	0	0	0	0	2,457	888	5,056	844	104	394
12	ND	Dunn Co	98.8	100	0.84	0.51	5.3	13	2,845	737	4,129	676	93.7	438
13	ND	Eddy Co	0	0	0	0	0	0	2,038	1,125	3,357	558	91.7	328
14	ND	Emmons Co	0	0	0	0	0	0	2,911	652	5,232	822	84.8	414
15	ND	Foster Co	0	0	0	0	0	0	2,738	1,417	5,335	859	119	394
16	ND	Golden Valley Co	0	0	0	0	0	0	2,762	2,067	2,572	470	152	392
17	ND	Grand Forks Co	144	229	26.3	3.74	641	14	22,803	3,557	12,685	2,030	740	2,951
18	ND	Grant Co	0	0	0	0	0	0	2,188	550	5,993	946	59.6	380
19	ND	Griggs Co	0	0	0	0	0	0	2,210	1,263	4,956	805	128	369
20	ND	Hettinger Co	0	0	0	0	0	0	2,321	798	4,880	801	81.6	335
21	ND	Kidder Co	0	0	0	0	0	0	4,762	2,178	4,930	824	153	672
22	ND	LaMoure Co	0	0	0	0	0	0	3,540	1,113	7,937	1,269	146	498
23	ND	Logan Co	0	0	0	0	0	0	1,833	451	3,177	520	57.4	300
24	ND	McHenry Co	0.9	47	54.6	23.7	0.2	107	4,474	2,296	6,810	1,123	214	668
25	ND	McIntosh Co	95.9	105	0.9	0.55	6	12.8	2,497	598	4,067	647	86.4	355
26	ND	McKenzie Co	205	578	3.49	3.31	213	13	4,474	984	6,080	961	103	688
27	ND	McLean Co	1,908	10,357	2,911	2,349	24,428	153	7,588	1,734	11,053	1,748	179	1,206
28	ND	Mercer Co	3,974	45,350	3,334	2,904	91,617	588	5,111	768	3,341	576	96.4	1,085
29	ND	Morton Co	752	1,883	882	826	6,833	182	13,145	3,141	8,295	1,305	339	1,463
30	ND	Mountrail Co	0	0	0	0	0	0	5,348	1,897	6,831	1,113	195	803
31	ND	Nelson Co	0	0	0	0	0	0	2,670	752	6,055	949	89.6	381
32	ND	Oliver Co	1,100	22,845	1,390	1,256	28,565	241	1,717	374	2,573	425	46.1	271
33	ND	Pembina Co	568	758	193	78.7	730	145	8,051	1,889	8,196	1,284	275	817
34	ND	Pierce Co	0	0	0	0	0	0	2,344	1,110	5,630	924	138	570
35	ND	Ramsey Co	0	0	0	0	0	0	5,281	1,248	7,615	1,223	170	823
36	ND	Ransom Co	106	89	56.1	35.4	1.5	298	2,798	894	5,598	895	140	409
37	ND	Renville Co	0	0	0	0	0	0	2,627	992	5,270	875	102	390
38	ND	Richland Co	70.3	390	55.5	20.2	149	3	11,983	3,239	11,698	1,906	573	1,563
39	ND	Rolette Co	0	0	0	0	0	0	7,942	1,194	7,948	1,179	182	953
40	ND	Sargent Co	0	0	0	0	0	0	3,262	981	7,487	1,190	287	493
41	ND	Sheridan Co	0	0	0	0	0	0	1,893	626	3,952	655	69.2	366
42	ND	Sioux Co	0	0	0	0	0	0	2,362	355	2,875	362	55.5	328
43	ND	Slope Co	0	0	0	0	0	0	1,314	633	1,944	352	55.2	351
44	ND	Stark Co	60.5	180	0	0	0.3	17.5	11,710	3,396	6,239	1,019	399	1,471
45	ND	Steele Co	0	0	0	0	0	0	2,078	1,005	5,764	942	107	332
46	ND	Sullyman Co	0	0	0	0	0	0	12,048	4,131	11,090	1,852	380	1,679
47	ND	Towner Co	0	0	0	0	0	0	2,607	826	7,985	1,273	115	378
48	ND	Trail Co	684	446	126	53.1	479	15.5	7,800	1,855	10,296	1,603	167	845
49	ND	Walsh Co	0	0	0	0	0	0	8,114	1,892	9,819	1,555	291	1,006
50	ND	Ward Co	0	0	0	0	0	0	17,079	4,279	14,872	2,366	561	2,399
51	ND	Wells Co	0	0	0	0	0	0	3,959	1,943	9,669	1,546	187	549
52	ND	Williams Co	527	2,313	25.1	25.1	1,605	45.4	8,645	2,542	8,750	1,420	269	1,364
Grand Total			11,017	85,873	9,063	7,583	155,982	2,029	284,181	81,289	346,273	55,633	9,878	39,932

CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
22,947	3,786	12,711	2,034	1,381	2,952

Grand Forks Co

SOURCE:
<http://www.epa.gov/air/data/geosell.html>
 USEPA - AirData NET Tier Report
 *Net Air pollution sources (area and point) in tons per year (2002)
 Site visited on 9 December 2009.

State of North Dakota Air Quality Control Region 172 (40 CFR 81.335)

Summary	Summarizes total emissions by calendar year for Construct Access Road/Parking at Buildings 314 and 242
Combustion	Estimates emissions from non-road equipment exhaust.
Fugitive	Estimates particulate emissions from construction activities including earthmoving, vehicle traffic, and windblown dust.
Grading	Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions.
Haul Truck On-Road	Estimates emissions from haul and water trucks delivering materials to the job site.
Construction Commuter	Estimates emissions for construction workers commuting to the site.
AQCR Tier Report	Summarizes total emissions for the State of North Dakota Air Quality Control Region 172 Tier report for 2002, to be used to compare the project to regional emissions.

Air Quality Emissions from Construct Access Road/Parking at Buildings 314 and 242

	NO _x (ton)	VOC (ton)	CO (ton)	SO ₂ (ton)	PM ₁₀ (ton)	PM _{2.5} (ton)	CO ₂ (ton)
Construction Combustion	0.337	0.020	0.136	0.007	0.021	0.020	41.497
Construction Fugitive Dust	-	-	-	-	1.653	0.165	-
Haul and Water Trucks	0.012	0.009	0.036	0.001	0.015	0.004	3.122
Construction Commuter	0.028	0.027	0.248	0.0003	0.003	0.002	32.870
TOTAL	0.376	0.056	0.421	0.008	1.691	0.191	77.490

Note: Total CY2010 PM_{10/2.5} fugitive dust emissions are assuming USEPA 50% control efficiencies.

CO₂ emissions converted to metric tons = **70.283 metric tons**
 State of North Dakota's CO₂ emissions = **53,550,515 metric tons (DOE/EIA 2005)**
 Percent of North Dakota's CO₂ emissions = **0.0001% metric tons**

Source: U.S. Department of Energy (DOE)/Energy Information Administration (EIA). 2005. State Carbon Dioxide Emissions Summary for the State of North Dakota. Available online: <http://www.eia.doe.gov/oiat/1605/state/state_emissions.html>. Accessed 9 December 2009

Since future year budgets were not readily available, actual 2002 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

State of North Dakota Air Quality Control Region 172

Year	Point and Area Sources Combined				
	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM _{2.5} (tpy)
2002	167,162	41,961	295,198	165,860	63,216

Source: USEPA-AirData NET Tier Report (<http://www.epa.gov/air/data/geosel.html>). Site visited on 9 December 2009.

Air Emissions from Construct Access Road/Parking at Buildings 314 and 242 Determination Significance (Significance Threshold = 10% of regional)

Point and Area Sources Combined				
NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM _{2.5} (tpy)
167,162	41,961	295,198	165,860	63,216
0.38	0.06	0.42	0.01	0.19
0.0002%	0.0001%	0.0001%	0.000005%	0.0005%
				0.0003%

Regional Emissions
 Emissions
 % of Regional

Combustion Emissions

Combustion Emissions of VOC, NO_x, SO₂, CO, PM_{2.5}, PM₁₀, and CO₂ due to Construction

General Construction Activities

Area Disturbed

Construct Access Road

114,300 ft²

Total General Construction Area:

0 ft²

0.0 acres

Total Demolition Area:

0 ft²

0.0 acres

Total Pavement Area:

114,300 ft²

2.6 acres

Total Disturbed Area:

114,300 ft²

2.6 acres

Construction Duration:

3 months

Annual Construction Activity:

60 days/yr

Assume 3 months, 4 weeks per month, 5 days per week.

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Bulldozer	1	13.60	95.742%	5.50	1.02	0.89	0.87	1456.90
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64	1141.65
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47	4941.53

Paving

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34	401.93
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42	536.07
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93	4685.95
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69	5623.96

Demolition

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90	1360.10
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87	3703.07

Building Construction

Equipment ^d	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Stationary								
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22	213.06
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31	291.92
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22	112.39
Mobile (non-road)								
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54	572.24
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49	931.93
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74	4464.51

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Req'd. ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77
Total per 10 acres of activity	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77

- The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
- The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO₂ emissions by more than a factor of two.
- Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO _x	VOC	CO	SO ₂ **	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469	4941.526
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693	5623.957
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865	3703.074
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744	4464.512
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.251	0.309	0.300	359.773
Architectural Coating**			0.000					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO_x = (Total Grading NO_x per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft ²)	Total Area (acres)	Total Days
Grading:	114,300	2.62	2
Paving:	114,300	2.62	13
Demolition:	0	0.00	0
Building Construction:	0	0.00	0
Architectural Coating	0	0.00	0

(from "Grading" worksheet)

(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	83.28	5.15	31.42	1.67	5.09	4.94	9,883
Paving	589.77	33.87	241.52	11.80	36.09	35.01	73,111
Demolition	-	-	-	-	-	-	0
Building Construction	-	-	-	-	-	-	0
Architectural Coatings	-	-	-	-	-	-	0
Total Emissions (lbs):	673.06	39.03	272.94	13.46	41.18	39.94	82,994

Results: Total Project Annual Emission Rates

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Total Project Emissions (lbs)	673.06	39.03	272.94	13.46	41.18	39.94	82,994
Total Project Emissions (tons)	0.34	0.02	0.14	0.01	0.02	0.02	41.50

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006

PM_{2.5} Emissions

PM_{2.5} Multiplier 0.10 (10% of PM₁₀ emissions assumed to be PM_{2.5}) EPA 2001; EPA 2006

Control Efficiency

0.50 (assume 50% control efficiency for PM₁₀ and PM_{2.5} emissions) EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM₁₀/acre-month)

Duration of Construction Project 3 months
Area 2.6 acres

General Construction Activities (0.19 ton PM₁₀/acre-month)

Duration of Construction Project - months
Area - acres

Project Emissions (tons/year)			
	PM₁₀ uncontrolled	PM₁₀ controlled	PM_{2.5} controlled
New Roadway Construction	3.31	1.65	0.17
General Construction Activities	0.00	0.00	0.00
Total	3.31	1.65	0.17

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10} /acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10} /acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10} /acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10} /acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10} /acre-month) and 75% of the average emission factor (0.11 ton PM_{10} /acre-month). The 0.19 ton PM_{10} /acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10} /acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP), which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10} /acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10} /acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM_{10} /acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999*. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Grading Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 2.6 acres/yr (from Combustion Worksheet)
Qty Equipment: 3.0 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units acre/day	Acres per equip-day	equip-days per acre	Acres/yr (project- specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	2.62	0.33
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	2.62	1.28
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	1.31	1.32
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	1.31	0.54
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	2.62	0.92
TOTAL								4.40

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 4.40
Qty Equipment: 3.00
Grading days/yr: 1.47

Haul and Water Truck Emissions

Emissions from hauling the raw materials for concrete and fill are estimated in this spreadsheet.
Emission Estimation Method: United States Air Force (USAF) Institute for Environment, Safety and Occupational Health Risk Analysis (IERA) Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations (Revised December 2003).

Raw Material Assumptions:

Haul trucks carry 20 cubic yards of material per trip.
The distance from the borrow pit is 5 miles, therefore the haul truck will travel 10 miles roundtrip.
Estimated number of trips required by haul trucks = total amount of material to be brought on installation/20 cubic yards per truck

Total amount of imported materials = 3,175 cubic yards area)
Number of trucks required = 159 heavy duty diesel haul trucks
Miles per trip = 10 miles

Water Transportation Assumptions:

Water trucks carry 4,000 gallons per truckload.
Approximately 534,353 gallons of water will be required during construction.
The project area would be watered with 1/8 inch of water, once per working day.
The distance from the nearest water source is 0.5 miles, therefore the water truck will travel 1 mile roundtrip.
Estimated number of trips required by water trucks = total gallons of water to be brought to project site/4,000 gallons per truck

Total amount of water needed for construction = 534,353 gallons
Number of trucks required = 134 heavy duty diesel haul trucks
Miles per trip = 1 miles

Heavy Duty Diesel Vehicle (HDDV) Average Emission Factors (grams/mile)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
HDDV	6.500	4.7000	19.10	0.512	7.7	2.01	1646

Notes:
Emission factors for all pollutants except CO₂ are from USAF IERA 2003.
Emission factors for PM, PM₁₀, SO_x are from HDDV in Table 4-50 (USAF IERA 2003).
Emission factors for VOC, CO, and NO_x are from Tables 4-41 through 4-43 for the 2010 calendar year, 2000 model year (USAF IERA 2003).
Diesel fuel produces 22,384 pounds of CO₂ per gallon.
It is assumed that the average HDDV has a fuel economy of 6.17 miles per gallon, Table 4-51 (USAF IERA 2003)
CO₂ emission factor = 22,384 lbs CO₂/gallon diesel * gallon diesel/6.17 miles * 453.6 g/lb

HDDV Haul and Water Truck Emissions From Construction Activities

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	24.66	17.83	72.47	1.94	29.33	7.63	6243.90
tons	0.012	0.009	0.036	0.001	0.015	0.004	3.122

Example Calculation: NO_x emissions (lbs) = miles per trip * number of trips * NO_x emission factor (g/mile) * lb/453.6 g

Construction Commuter Emissions

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>.

Assumptions:

Passenger vehicle emission factors for scenario year 2010 are used

The average roundtrip commute for a construction worker = 40 miles

Number of construction days = 60 days

Number of construction workers (daily) = 25 people

Passenger Vehicle Emission Factors for Year 2010 (lbs/mile)

NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
0.00091814	0.00091399	0.00826276	0.00001077	0.00008698	0.00005478	1.09568235

updated April 24, 2008. Available online: <<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>>. Accessed 27 May 2009.

Notes:

The SMAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC

Construction Commuter Emissions

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	55.088	54.839	495.765	0.646	5.219	3.287	65740.941
tons	0.028	0.027	0.248	0.0003	0.0026	0.0016	32.870

Example Calculation: NO_x emissions (lbs) = 60 miles/day * NO_x emission factor (lb/mile) * number of construction days * number of workers

State of North Dakota Air Quality Control Region 172

Row #	State	County	Point Source Emissions					Area Source Emissions (Non-Point and Mobile Sources)						
			CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
1	ND	Adams Co	0	0	0	0	0	0	1,799	533	4,911	763	57.3	308
2	ND	Barnes Co	0	0	0	0	0	0	7,832	3,740	9,687	1,605	355	949
3	ND	Benson Co	0	0	0	0	0	0	4,941	1,130	7,364	1,173	145	700
4	ND	Billings Co	34.9	41.7	3.11	3.11	283	3.5	2,588	1,365	1,421	276	89.9	430
5	ND	Buttineau Co	0	0	0	0	0	0	5,583	1,559	7,809	1,315	179	723
6	ND	Bowman Co	0	0	0	0	0	0	2,250	738	2,716	447	73	390
7	ND	Burke Co	57.3	181	0.71	0.6	426	5.2	2,375	885	5,894	960	97.3	386
8	ND	Burligh Co	0	0	0	0	0	0	22,345	4,560	10,005	1,495	713	3,001
9	ND	Cavalier Co	0	0	0	0	0	0	4,094	1,489	11,343	1,810	166	547
10	ND	Dickey Co	0	0	0	0	0	0	4,045	940	7,102	1,117	120	607
11	ND	Divide Co	0	0	0	0	0	0	2,457	888	5,056	844	104	394
12	ND	Dunn Co	96.8	100	0.84	0.51	5.3	13	2,845	737	4,129	676	93.7	438
13	ND	Eddy Co	0	0	0	0	0	0	2,038	1,125	3,357	558	91.7	328
14	ND	Emmons Co	0	0	0	0	0	0	2,911	652	5,232	822	84.8	414
15	ND	Foster Co	0	0	0	0	0	0	2,738	1,417	5,335	859	119	394
16	ND	Golden Valley Co	0	0	0	0	0	0	2,762	2,067	2,572	470	152	392
17	ND	Grand Forks Co	144	229	26.3	3.74	641	1.4	22,803	3,557	12,685	2,030	740	2,951
18	ND	Grant Co	0	0	0	0	0	0	2,188	550	5,993	946	59.6	380
19	ND	Griggs Co	0	0	0	0	0	0	2,210	1,263	4,956	805	128	369
20	ND	Hettinger Co	0	0	0	0	0	0	2,321	798	4,880	801	81.6	335
21	ND	Kidder Co	0	0	0	0	0	0	4,762	2,178	4,930	824	153	672
22	ND	LaMoure Co	0	0	0	0	0	0	3,540	1,113	7,937	1,269	146	498
23	ND	Logan Co	0	0	0	0	0	0	1,833	451	3,177	520	57.4	300
24	ND	McHenry Co	0.9	47	54.6	23.7	0.2	107	4,474	2,296	6,810	1,123	214	668
25	ND	McIntosh Co	95.9	105	0.9	0.55	6	12.8	2,497	598	4,067	647	86.4	355
26	ND	McKenzie Co	205	578	3.49	3.31	213	13	4,474	984	6,060	961	103	688
27	ND	McLean Co	1,908	10,357	2,911	2,349	24,428	153	7,588	1,734	11,053	1,748	179	1,206
28	ND	Merced Co	3,974	45,350	3,334	2,904	91,617	588	5,111	768	3,341	576	96.4	1,085
29	ND	Morton Co	752	1,883	882	826	6,833	182	13,145	3,141	8,295	1,305	339	1,463
30	ND	Mountrail Co	0	0	0	0	0	0	5,348	1,897	6,831	1,113	195	803
31	ND	Nelson Co	0	0	0	0	0	0	2,670	752	6,055	949	89.6	381
32	ND	Oliver Co	1,100	22,845	1,390	1,256	28,565	241	1,717	374	2,573	425	46.1	271
33	ND	Pembina Co	588	758	193	78.7	730	145	8,051	1,889	8,196	1,264	275	817
34	ND	Pierce Co	0	0	0	0	0	0	2,344	1,110	5,630	924	138	570
35	ND	Ramsey Co	0	0	0	0	0	0	5,281	1,248	7,615	1,223	170	823
36	ND	Ransom Co	106	69	56.1	35.4	1.5	298	2,798	894	5,598	895	140	409
37	ND	Renville Co	0	0	0	0	0	0	2,627	992	5,270	875	102	390
38	ND	Richland Co	703	390	55.5	20.2	149	3	11,983	3,239	11,698	1,906	573	1,563
39	ND	Rolette Co	0	0	0	0	0	0	7,942	1,194	7,948	1,179	182	953
40	ND	Sargent Co	0	0	0	0	0	0	3,262	981	7,487	1,190	287	493
41	ND	Sheridan Co	0	0	0	0	0	0	1,893	626	3,952	655	69.2	386
42	ND	Sioux Co	0	0	0	0	0	0	2,362	355	2,875	362	55.5	328
43	ND	Slope Co	0	0	0	0	0	0	1,314	633	1,944	352	55.2	351
44	ND	Stark Co	60.5	180	0	0	0.3	17.5	11,710	3,396	6,239	1,019	399	1,471
45	ND	Steele Co	0	0	0	0	0	0	2,078	1,005	5,764	942	107	332
46	ND	Suitsman Co	0	0	0	0	0	0	185	12,048	4,131	11,090	1,852	380
47	ND	Towner Co	0	0	0	0	0	0	2,607	826	7,985	1,273	115	378
48	ND	Trail Co	684	446	126	53.1	479	15.5	7,800	1,855	10,296	1,603	167	845
49	ND	Walsh Co	0	0	0	0	0	0	8,114	1,892	9,819	1,555	291	1,006
50	ND	Ward Co	0	0	0	0	0	0	17,079	4,279	14,872	2,366	561	2,399
51	ND	Wells Co	0	0	0	0	0	0	3,959	1,943	9,669	1,546	187	549
52	ND	Williams Co	527	2,313	25.1	25.1	1,605	45.4	8,645	2,542	8,750	1,420	269	1,364
Grand Total			11,017	85,873	9,063	7,583	155,982	2,029	284,181	81,289	346,273	55,633	9,878	39,932

SOURCE:
<http://www.epa.gov/air/data/geossl.html>
 USEPA - AirData NET Tier Report
 *Net Air pollution sources (area and point) in tons per year (2002)
 Site visited on 9 December 2009.

State of North Dakota Air Quality Control Region 172 (40 CFR 81.335)

CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
22,947	3,786	12,711	2,034	1,381	2,952

Grand Forks Co

Summary	Summarizes total emissions by calendar year for I2. Energy Conservation: Repair HVAC-GSHP-CATM
Combustion	Estimates emissions from non-road equipment exhaust.
Fugitive	Estimates particulate emissions from construction activities including earthmoving, vehicle traffic, and windblown dust.
Grading	Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions.
Haul Truck On-Road	Estimates emissions from haul and water trucks delivering materials to the job site.
Construction Commuter	Estimates emissions for construction workers commuting to the site.
AQCR Tier Report	Summarizes total emissions for the State of North Dakota Air Quality Control Region 172 Tier report for 2002, to be used to compare the project to regional emissions.

Air Quality Emissions from Repair HVAC-GSHP-CATM

	NO _x (ton)	VOC (ton)	CO (ton)	SO ₂ (ton)	PM ₁₀ (ton)	PM _{2.5} (ton)	CO ₂ (ton)
Construction Combustion	0.021	0.001	0.008	0.0004	0.001	0.001	2.471
Construction Fugitive Dust	-	-	-	-	0.153	0.008	-
Haul and Water Trucks	0.001	0.0004	0.002	0.00004	0.001	0.0002	0.144
Construction Commuter	0.022	0.022	0.198	0.0003	0.002	0.001	26.296
TOTAL	0.043	0.024	0.208	0.001	0.157	0.010	28.911

Note: Total CY2010 PM_{10/2.5} fugitive dust emissions are assuming USEPA 50% control efficiencies.

CO₂ emissions converted to metric tons = **26.222 metric tons**
State of North Dakota's CO₂ emissions = **53,550,515 metric tons (DOE/EIA 2005)**
Percent of North Dakota's CO₂ emissions = **0.00005% metric tons**

Source: U.S. Department of Energy (DOE)/Energy Information Administration (EIA). 2005. State Carbon Dioxide Emissions Summary for the State of North Dakota. Available online: <http://www.eia.doe.gov/oiat/1605/state/state_emissions.html>. Accessed 9 December 2009

Since future year budgets were not readily available, actual 2002 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

State of North Dakota Air Quality Control Region 172

Year	Point and Area Sources Combined				
	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM _{2.5} (tpy)
2002	167,162	41,961	295,198	165,860	355,336
					63,216

Source: USEPA-AirData NET Tier Report (<http://www.epa.gov/air/data/geosel.html>). Site visited on 9 December 2009.

Air Emissions from Energy Conservation: Repair HVAC-GSHP-COMM SQ Determination Significance (Significance Threshold = 10% of regional)

Point and Area Sources Combined				
NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM _{2.5} (tpy)
167,162	41,961	295,198	165,860	355,336
0.04	0.02	0.21	0.001	0.16
0.00003%	0.0001%	0.000004%	0.00004%	0.00002%

Regional Emissions
Emissions
% of Regional

Combustion Emissions

Combustion Emissions of VOC, NO_x, SO₂, CO, PM_{2.5}, PM₁₀, and CO₂ due to Construction

General Construction Activities

Area Disturbed

Construct GSHP Infrastructure

11,710 ft²

assume vertical piping with 13,577 ft² of land disturbance

Total General Construction Area:

0 ft²

0.0 acres

Total Demolition Area:

0 ft²

0.0 acres

Total Pavement Area:

0 ft²

0.0 acres

Total Disturbed Area:

11,710 ft²

0.3 acres

Construction Duration:

6 months

Annual Construction Activity:

Assume 6 months, 4 weeks per month, 5 days per week.

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Bulldozer	1	13.60	95.742%	5.50	1.02	0.89	0.87	1456.90
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64	1141.65
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47	4941.53

Paving

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34	401.93
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42	536.07
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93	4685.95
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69	5623.96

Demolition

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90	1360.10
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87	3703.07

Building Construction

Equipment ^d	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Stationary								
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22	213.06
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31	291.92
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22	112.39
Mobile (non-road)								
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54	572.24
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49	931.93
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74	4464.51

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77
Total per 10 acres of activity	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77

- The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
- The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO₂ emissions by more than a factor of two.
- Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO _x	VOC	CO	SO ₂ **	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	1	41.641	2.577	15.710	0.833	2.546	2.469	4941.526
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693	5623.957
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865	3703.074
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744	4464.512
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.251	0.309	0.300	359.773
Architectural Coating**			0.000					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO_x = (Total Grading NO_x per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft ²)	Total Area (acres)	Total Days
Grading:	11,710	0.27	1
Paving:	0	0.00	0
Demolition:	0	0.00	0
Building Construction:	0	0.00	0
Architectural Coating	0	0.00	0

(from "Grading" worksheet)

(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	41.64	2.58	15.71	0.83	2.55	2.47	4,942
Paving	-	-	-	-	-	-	0
Demolition	-	-	-	-	-	-	0
Building Construction	-	-	-	-	-	-	0
Architectural Coatings	-	-	-	-	-	-	0
Total Emissions (lbs):	41.64	2.58	15.71	0.83	2.55	2.47	4,942

Results: Total Project Annual Emission Rates

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Total Project Emissions (lbs)	41.64	2.58	15.71	0.83	2.55	2.47	4,942
Total Project Emissions (tons)	0.02	0.00	0.01	0.00	0.00	0.00	2.47

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19 ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006	
New Road Construction	0.42 ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006	

PM_{2.5} Emissions

PM_{2.5} Multiplier 0.10 (10% of PM₁₀ emissions assumed to be PM_{2.5}) EPA 2001; EPA 2006

Control Efficiency

0.50 (assume 50% control efficiency for PM₁₀ and PM_{2.5} emissions) EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM₁₀/acre-month)

Duration of Construction Project - months
Area - acres

General Construction Activities (0.19 ton PM₁₀/acre-month)

Duration of Construction Project 6 months
Area 0.3 acres

Project Emissions (tons/year)			
	PM₁₀ uncontrolled	PM₁₀ controlled	PM_{2.5} controlled
New Roadway Construction	0.00	0.00	0.000
General Construction Activities	0.31	0.15	0.008
Total	0.31	0.15	0.008

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10} /acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10} /acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10} /acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10} /acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10} /acre-month) and 75% of the average emission factor (0.11 ton PM_{10} /acre-month). The 0.19 ton PM_{10} /acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10} /acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP), which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10} /acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10} /acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM_{10} /acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999*. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.
EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.
MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Grading Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 0.3 acres/yr (from Combustion Worksheet)
Qty Equipment: 3.0 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units acre/day	Acres per equip-day	equip-days per acre	Acres/yr (project- specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	0.27	0.03
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	0.27	0.13
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	0.13	0.14
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	0.13	0.06
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	0.27	0.09
TOTAL								0.45

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 0.45
Qty Equipment: 3.00
Grading days/yr: 0.15

Haul and Water Truck Emissions

Emissions from hauling the raw materials for concrete and fill are estimated in this spreadsheet.
Emission Estimation Method: United States Air Force (USAF) Institute for Environment, Safety and Occupational Health Risk Analysis (IERA) Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations (Revised December 2003).

Raw Material Assumptions:

Haul trucks carry 20 cubic yards of material per trip.
The distance from the borrow pit is 5 miles, therefore the haul truck will travel 10 miles roundtrip.
Estimated number of trips required by haul trucks = total amount of material to be brought on installation/20 cubic yards per truck

Total amount of imported materials = 104 cubic yards (Assume 24 bore holes, each 6 inches by 200 feet)
Number of trucks required = 5 heavy duty diesel haul trucks
Miles per trip = 10 miles

Water Transportation Assumptions:

Water trucks carry 4,000 gallons per truckload.
Approximately 126,945 gallons of water will be required during construction.
Approximately, 1/8 of water would be applied to project area once per day.
The distance from the nearest water source is 0.5 miles, therefore the water truck will travel 1 mile roundtrip.
Estimated number of trips required by water trucks = total gallons of water to be brought to project site/4,000 gallons per truck

Total amount of water needed for construction = 109,489 gallons
Number of trucks required = 27 heavy duty diesel haul trucks
Miles per trip = 1 miles

Heavy Duty Diesel Vehicle (HDDV) Average Emission Factors (grams/mile)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
HDDV	6.500	4.7000	19.10	0.512	7.7	2.01	1646

Notes:
Emission factors for all pollutants except CO₂ are from USAF IERA 2003.
Emission factors for PM, PM₁₀, SO_x are from HDDV in Table 4-50 (USAF IERA 2003).
Emission factors for VOC, CO, and NO_x are from Tables 4-41 through 4-43 for the 2010 calendar year, 2000 model year (USAF IERA 2003).
Diesel fuel produces 22,384 pounds of CO₂ per gallon.
It is assumed that the average HDDV has a fuel economy of 6.17 miles per gallon, Table 4-51 (USAF IERA 2003)
CO₂ emission factor = 22,384 lbs CO₂/gallon diesel * gallon diesel/6.17 miles * 453.6 g/lb

HDDV Haul and Water Truck Emissions From Construction Activities

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	1.14	0.82	3.34	0.09	1.35	0.35	287.41
tons	0.0006	0.0004	0.002	0.00004	0.0007	0.0002	0.144

Example Calculation: NO_x emissions (lbs) = miles per trip * number of trips * NO_x emission factor (g/mile) * lb/453.6 g

Construction Commuter Emissions

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>.

Assumptions:

Passenger vehicle emission factors for scenario year 2010 are used

The average roundtrip commute for a construction worker =

Number of construction days =

Number of construction workers (daily) =

40 miles

120 days

10 people

Passenger Vehicle Emission Factors for Year 2010 (lbs/mile)

NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
0.00091814	0.00091399	0.00826276	0.00001077	0.00008698	0.00005478	1.09568235

Source: South Coast Air Quality Management District. EMFAC 2007 (ver 2.3) On-Road Emissions Factors. Last updated April 24, 2008. Available online: <<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>>. Accessed 27 May 2009.

Notes:

The SQAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC

Construction Commuter Emissions

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	44.071	43.871	396.612	0.517	4.175	2.630	52592.753
tons	0.022	0.022	0.198	0.0003	0.0021	0.0013	26.296

Example Calculation: NO_x emissions (lbs) = 60 miles/day * NO_x emission factor (lb/mile) * number of construction days * number of workers

State of North Dakota Air Quality Control Region 172

Row #	State	County	Point Source Emissions					Area Source Emissions (Non-Point and Mobile Sources)						
			CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
1	ND	Adams Co	0	0	0	0	0	0	1,799	533	4,911	763	57.3	308
2	ND	Barnes Co	0	0	0	0	0	0	7,832	3,740	9,687	1,605	355	949
3	ND	Benson Co	0	0	0	0	0	0	4,941	1,130	7,364	1,173	145	700
4	ND	Billings Co	34.9	41.7	3.11	3.11	283	3.5	2,588	1,365	1,421	276	89.9	430
5	ND	Bottineau Co	0	0	0	0	0	0	5,583	1,559	7,809	1,315	179	723
6	ND	Bowman Co	0	0	0	0	0	0	2,250	738	2,716	447	73	390
7	ND	Burke Co	57.3	181	0.71	0.6	426	5.2	2,375	885	5,894	960	97.3	386
8	ND	Burling Co	0	0	0	0	0	0	22,345	4,560	10,005	1,495	713	3,001
9	ND	Cavalier Co	0	0	0	0	0	0	4,094	1,489	11,343	1,810	166	547
10	ND	Dickey Co	0	0	0	0	0	0	4,045	940	7,102	1,117	120	607
11	ND	Divide Co	0	0	0	0	0	0	2,457	888	5,056	844	104	394
12	ND	Dunn Co	96.8	100	0.84	0.51	5.3	13	2,845	737	4,129	676	93.7	438
13	ND	Eddy Co	0	0	0	0	0	0	2,038	1,125	3,357	558	91.7	328
14	ND	Emmons Co	0	0	0	0	0	0	2,911	652	5,232	822	84.8	414
15	ND	Foster Co	0	0	0	0	0	0	2,738	1,417	5,335	859	119	394
16	ND	Golden Valley Co	0	0	0	0	0	0	2,762	2,067	2,572	470	152	392
17	ND	Grand Forks Co	144	229	26.3	3.74	641	1.4	22,803	3,557	12,685	2,030	740	2,951
18	ND	Grant Co	0	0	0	0	0	0	2,188	550	5,993	946	59.6	380
19	ND	Griggs Co	0	0	0	0	0	0	2,210	1,263	4,956	805	128	369
20	ND	Hettinger Co	0	0	0	0	0	0	2,321	798	4,880	801	81.6	335
21	ND	Kidder Co	0	0	0	0	0	0	4,762	2,178	4,930	824	153	672
22	ND	LaMoure Co	0	0	0	0	0	0	3,540	1,113	7,937	1,269	146	498
23	ND	Logan Co	0	0	0	0	0	0	1,833	451	3,177	520	57.4	300
24	ND	McHenry Co	0.9	47	54.6	23.7	0.2	107	4,474	2,296	6,810	1,123	214	668
25	ND	McIntosh Co	95.9	105	0.9	0.55	6	12.8	2,497	598	4,067	647	86.4	355
26	ND	McKenzie Co	205	578	3.49	3.31	213	13	4,474	964	6,060	961	103	688
27	ND	McLean Co	1,908	10,357	2,911	2,349	24,428	153	7,588	1,734	11,053	1,748	179	1,206
28	ND	Merced Co	3,974	45,350	3,334	2,904	91,617	768	5,111	768	3,341	576	96.4	1,085
29	ND	Morton Co	752	1,883	882	826	6,833	182	13,145	3,141	8,295	1,305	339	1,463
30	ND	Mountrail Co	0	0	0	0	0	0	5,348	1,897	6,831	1,113	195	803
31	ND	Nelson Co	0	0	0	0	0	0	2,670	752	6,055	949	89.6	381
32	ND	Oliver Co	1,100	22,845	1,390	1,256	28,565	241	1,717	374	2,573	425	46.1	271
33	ND	Pembina Co	568	758	193	78.7	730	145	8,051	1,889	8,196	1,264	275	817
34	ND	Pierce Co	0	0	0	0	0	0	2,344	1,110	5,630	924	138	570
35	ND	Ramsey Co	0	0	0	0	0	0	5,281	1,248	7,615	1,223	170	823
36	ND	Ransom Co	106	69	56.1	35.4	1.5	298	2,798	894	5,598	895	140	409
37	ND	Renville Co	0	0	0	0	0	0	2,627	992	5,270	875	102	390
38	ND	Richland Co	703	390	55.5	20.2	149	3	11,983	3,239	11,698	1,906	573	1,563
39	ND	Rollette Co	0	0	0	0	0	0	7,942	1,194	7,948	1,179	182	953
40	ND	Sargent Co	0	0	0	0	0	0	3,262	981	7,487	1,190	287	493
41	ND	Sheridan Co	0	0	0	0	0	0	1,693	626	3,952	655	69.2	386
42	ND	Sioux Co	0	0	0	0	0	0	2,362	355	2,875	362	55.5	328
43	ND	Slope Co	0	0	0	0	0	0	1,314	633	1,944	352	55.2	351
44	ND	Stark Co	60.5	180	0	0	0.3	17.5	11,710	3,396	6,239	1,019	399	1,471
45	ND	Steele Co	0	0	0	0	0	0	2,078	1,005	5,764	942	107	332
46	ND	Suitsman Co	0	0	0	0	0	0	12,048	4,131	11,090	1,852	380	1,679
47	ND	Towner Co	0	0	0	0	0	0	2,607	826	7,985	1,273	115	378
48	ND	Trail Co	684	446	128	53.1	479	15.5	7,800	1,855	10,296	1,603	167	845
49	ND	Walsh Co	0	0	0	0	0	0	8,114	1,892	9,819	1,555	291	1,006
50	ND	Ward Co	0	0	0	0	0	0	17,079	4,279	14,872	2,366	561	2,399
51	ND	Wells Co	0	0	0	0	0	0	3,959	1,943	9,669	1,546	187	549
52	ND	Williams Co	527	2,313	25.1	25.1	1,605	45.4	8,645	2,542	8,750	1,420	269	1,364
Grand Total			11,017	85,873	9,063	7,583	155,982	2,029	284,181	81,289	346,273	55,633	9,878	39,932

Grand Forks Co

CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
22,947	3,786	12,711	2,034	1,381	2,952

State of North Dakota Air Quality Control Region 172 (40 CFR 81.335)

SOURCE:
<http://www.epa.gov/air/data/geosel.html>
 USEPA - AirData NET Tier Report
 *Net Air pollution sources (area and point) in tons per year (2002)
 Site visited on 9 December 2009.

Summary	Summarizes total emissions by calendar year for Repair Runway-Mill and Overlay (S/R)
Combustion	Estimates emissions from non-road equipment exhaust.
Fugitive	Estimates particulate emissions from construction activities including earthmoving, vehicle traffic, and windblown dust.
Grading	Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions.
Haul Truck On-Road	Estimates emissions from haul and water trucks delivering materials to the job site.
Construction Commuter	Estimates emissions for construction workers commuting to the site.
AQCR Tier Report	Summarizes total emissions for the State of North Dakota Air Quality Control Region 172 Tier report for 2002, to be used to compare the project to regional emissions.

Air Quality Emissions from Repair Runway-Mill and Overlay (S/R)

	NO _x (ton)	VOC (ton)	CO (ton)	SO ₂ (ton)	PM ₁₀ (ton)	PM _{2.5} (ton)	CO ₂ (ton)
Construction Combustion	5.104	0.295	2.074	0.102	0.312	0.303	630.130
Construction Fugitive Dust	-	-	-	-	107.169	10.717	-
Haul and Water Trucks	0.184	0.133	0.542	0.015	0.219	0.057	46.671
Construction Commuter	0.110	0.110	0.992	0.001	0.010	0.007	131.482
TOTAL	5.399	0.538	3.607	0.118	107.711	11.083	808.283

Note: Total CY2010 PM_{10/2.5} fugitive dust emissions are assuming USEPA 50% control efficiencies.

CO₂ emissions converted to metric tons = **733.113 metric tons**
 State of North Dakota's CO₂ emissions = **53,550,515 metric tons (DOE/EIA 2005)**
 Percent of North Dakota's CO₂ emissions = **0.001% metric tons**

Source: U.S. Department of Energy (DOE)/Energy Information Administration (EIA). 2005. State Carbon Dioxide Emissions Summary for the State of North Dakota. Available online: <http://www.eia.doe.gov/oiat/1605/state/state_emissions.html>. Accessed 9 December 2009

Since future year budgets were not readily available, actual 2002 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

State of North Dakota Air Quality Control Region 172

Year	Point and Area Sources Combined				
	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM _{2.5} (tpy)
2002	167,162	41,961	295,198	165,860	355,336
					63,216

Source: USEPA-AirData NET Tier Report (<http://www.epa.gov/air/data/geosel.html>). Site visited on 9 December 2009.

Air Emissions from Repair Runway-Mill and Overlay (S/R) Determination Significance (Significance Threshold = 10% of regional)

Point and Area Sources Combined				
NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM _{2.5} (tpy)
167,162	41,961	295,198	165,860	355,336
5.40	0.54	3.61	0.12	107.71
0.003%	0.001%	0.001%	0.0001%	0.030%
				0.018%

Regional Emissions
Emissions
% of Regional

Combustion Emissions

Combustion Emissions of VOC, NO_x, SO₂, CO, PM_{2.5}, PM₁₀, and CO₂ due to Construction

General Construction Activities

Area Disturbed

Repair Runway

1,852,497 ft²

Total General Construction Area:

0 ft²

0.0 acres

Total Demolition Area:

0 ft²

0.0 acres

Total Pavement Area:

1,852,497 ft²

42.5 acres

Total Disturbed Area:

1,852,497 ft²

42.5 acres

Construction Duration:

12 months

Annual Construction Activity:

240 days/yr

Assume 12 months, 4 weeks per month, 5 days per week.

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Bulldozer	1	13.60	95.742%	5.50	1.02	0.89	0.87	1456.90
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64	1141.65
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47	4941.53

Paving

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34	401.93
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42	536.07
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93	4685.95
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69	5623.96

Demolition

Equipment	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90	1360.10
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87	3703.07

Building Construction

Equipment ^d	No. Req ^d . ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Stationary								
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22	213.06
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31	291.92
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22	112.39
Mobile (non-road)								
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54	572.24
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49	931.93
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74	4464.51

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Req'd. ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77
Total per 10 acres of activity	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77

- The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
- The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO₂ emissions by more than a factor of two.
- Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO _x	VOC	CO	SO ₂ **	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	4	166.565	10.308	62.840	3.331	10.182	9.877	19766.105
Paving Equipment	4	181.469	10.423	74.314	3.629	11.104	10.771	22495.827
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865	3703.074
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744	4464.512
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.251	0.309	0.300	359.773
Architectural Coating**			0.000					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO_x = (Total Grading NO_x per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft ²)	Total Area (acres)	Total Days
Grading:	1,852,497	42.53	6
Paving:	1,852,497	42.53	51
Demolition:	0	0.00	0
Building Construction:	0	0.00	0
Architectural Coating	0	0.00	0

(from "Grading" worksheet)

(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	999.39	61.85	377.04	19.99	61.09	59.26	118,597
Paving	9,209.56	528.96	3,771.42	184.19	563.55	546.64	1,141,663
Demolition	-	-	-	-	-	-	0
Building Construction	-	-	-	-	-	-	0
Architectural Coatings	-	-	-	-	-	-	0
Total Emissions (lbs):	10,208.95	590.81	4,148.46	204.18	624.64	605.90	1,260,260

Results: Total Project Annual Emission Rates

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Total Project Emissions (lbs)	10,208.95	590.81	4,148.46	204.18	624.64	605.90	1,260,260
Total Project Emissions (tons)	5.10	0.30	2.07	0.10	0.31	0.30	630.13

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006

PM_{2.5} Emissions

PM_{2.5} Multiplier 0.10 (10% of PM₁₀ emissions assumed to be PM_{2.5}) EPA 2001; EPA 2006

Control Efficiency

0.50 (assume 50% control efficiency for PM₁₀ and PM_{2.5} emissions) EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM₁₀/acre-month)

Duration of Construction Project 12 months
Area 42.5 acres

General Construction Activities (0.19 ton PM₁₀/acre-month)

Duration of Construction Project - months
Area - acres

Project Emissions (tons/year)			
	PM₁₀ uncontrolled	PM₁₀ controlled	PM_{2.5} controlled
New Roadway Construction	214.34	107.17	10.72
General Construction Activities	0.00	0.00	0.00
Total	214.34	107.17	10.72

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM₁₀/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM₁₀/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM₁₀/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM₁₀/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM₁₀/acre-month) and 75% of the average emission factor (0.11 ton PM₁₀/acre-month). The 0.19 ton PM₁₀/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM₁₀/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP), which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM₁₀ and PM_{2.5} in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM₁₀/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM₁₀/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM₁₀/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

PM_{2.5} Multiplier

PM_{2.5} emissions are estimated by applying a particle size multiplier of 0.10 to PM₁₀ emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM₁₀ and PM_{2.5}

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM₁₀ and PM_{2.5} in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999*. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Grading Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 42.5 acres/yr (from Combustion Worksheet)
Qty Equipment: 13.0 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units acre/day	Acres per equip-day	equip-days per acre	Acres/yr (project- specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	42.53	5.32
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	42.53	20.79
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	21.26	21.44
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	21.26	8.80
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	42.53	14.92
TOTAL								71.26

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 71.26
Qty Equipment: 13.00
Grading days/yr: 5.48

Haul and Water Truck Emissions

Emissions from hauling the raw materials for concrete and fill are estimated in this spreadsheet.
Emission Estimation Method: United States Air Force (USAF) Institute for Environment, Safety and Occupational Health Risk Analysis (IERA) Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations (Revised December 2003).

Raw Material Assumptions:

Haul trucks carry 20 cubic yards of material per trip.
The distance from the borrow pit is 5 miles, therefore the haul truck will travel 10 miles roundtrip.
Estimated number of trips required by haul trucks = total amount of material to be brought on installation/20 cubic yards per truck

Total amount of imported materials = 51,458 cubic yards area)
Number of trucks required = 2,573 heavy duty diesel haul trucks
Miles per trip = 10 miles

Heavy Duty Diesel Vehicle (HDDV) Average Emission Factors (grams/mile)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
HDDV	6.500	4.7000	19.10	0.512	7.7	2.01	1646

Notes:
Emission factors for all pollutants except CO₂ are from USAF IERA 2003.
Emission factors for PM, PM₁₀, SO_x are from HDDV in Table 4-50 (USAF IERA 2003).
Emission factors for VOC, CO, and NO_x are from Tables 4-41 through 4-43 for the 2010 calendar year, 2000 model year (USAF IERA 2003).
Diesel fuel produces 22,384 pounds of CO₂ per gallon.
It is assumed that the average HDDV has a fuel economy of 6.17 miles per gallon, Table 4-51 (USAF IERA 2003)
CO₂ emission factor = 22,384 lbs CO₂/gallon diesel * gallon diesel/6.17 miles * 453.6 g/lb

HDDV Haul and Water Truck Emissions From Construction Activities

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	368.69	266.59	1083.39	29.04	438.46	114.01	93342.10
tons	0.184	0.133	0.542	0.015	0.219	0.057	46.671

Example Calculation: NO_x emissions (lbs) = miles per trip * number of trips * NO_x emission factor (g/mile) * lb/453.6 g

Construction Commuter Emissions

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>.

Assumptions:

Passenger vehicle emission factors for scenario year 2010 are used

The average roundtrip commute for a construction worker = 40 miles

Number of construction days = 240 days

Number of construction workers (daily) = 25 people

Passenger Vehicle Emission Factors for Year 2010 (lbs/mile)

NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
0.00091814	0.00091399	0.00826276	0.00001077	0.00008698	0.00005478	1.09568235

updated April 24, 2008. Available online: <<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>>. Accessed 27 May 2009.

Notes:

The SMAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC

Construction Commuter Emissions

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
lbs	220.354	219.357	1983.062	2.586	20.875	13.148	262963.764
tons	0.110	0.110	0.992	0.0013	0.0104	0.0066	131.482

Example Calculation: NO_x emissions (lbs) = 60 miles/day * NO_x emission factor (lb/mile) * number of construction days * number of workers

State of North Dakota Air Quality Control Region 172

Row #	State	County	Point Source Emissions					Area Source Emissions (Non-Point and Mobile Sources)						
			CO	NO _x	PM ₁₀	PM _{2.5}	VOC	SO ₂	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
1	ND	Adams Co	0	0	0	0	0	0	1,799	533	4,911	763	57.3	308
2	ND	Barnes Co	0	0	0	0	0	0	7,832	3,740	9,687	1,605	355	949
3	ND	Benson Co	0	0	0	0	0	0	4,941	1,130	7,364	1,173	145	700
4	ND	Billings Co	34.9	41.7	3.11	3.11	283	3.5	2,588	1,365	1,421	276	89.9	430
5	ND	Buttineau Co	0	0	0	0	0	0	5,583	1,559	7,809	1,315	179	723
6	ND	Bowman Co	0	0	0	0	0	0	2,250	738	2,716	447	73	390
7	ND	Burke Co	57.3	181	0.71	0.6	426	5.2	2,375	885	5,894	960	97.3	386
8	ND	Burligh Co	0	0	0	0	0	0	22,345	4,560	10,005	1,495	713	3,001
9	ND	Cavalier Co	0	0	0	0	0	0	4,094	1,489	11,343	1,810	166	547
10	ND	Dickey Co	0	0	0	0	0	0	4,045	940	7,102	1,117	120	607
11	ND	Divide Co	0	0	0	0	0	0	2,457	888	5,056	844	104	394
12	ND	Dunn Co	96.8	100	0.84	0.51	5.3	13	2,845	737	4,129	676	93.7	438
13	ND	Edley Co	0	0	0	0	0	0	2,038	1,125	3,357	558	91.7	328
14	ND	Emmons Co	0	0	0	0	0	0	2,911	652	5,232	822	84.8	414
15	ND	Foster Co	0	0	0	0	0	0	2,738	1,417	5,335	859	119	394
16	ND	Golden Valley Co	0	0	0	0	0	0	2,762	2,067	2,572	470	152	392
17	ND	Grand Forks Co	144	229	26.3	3.74	641	1.4	22,803	3,557	12,685	2,030	740	2,951
18	ND	Grant Co	0	0	0	0	0	0	2,188	550	5,983	946	59.6	380
19	ND	Griggs Co	0	0	0	0	0	0	2,210	1,263	4,956	805	128	369
20	ND	Hettinger Co	0	0	0	0	0	0	2,321	798	4,880	801	81.6	335
21	ND	Kidder Co	0	0	0	0	0	0	4,762	2,178	4,930	824	153	672
22	ND	LaMoure Co	0	0	0	0	0	0	3,540	1,113	7,937	1,269	146	498
23	ND	Logan Co	0	0	0	0	0	0	1,833	451	3,177	520	57.4	300
24	ND	McHenry Co	0.9	47	54.6	23.7	0.2	107	4,474	2,296	6,810	1,123	214	668
25	ND	McIntosh Co	95.9	105	0.9	0.55	6	12.8	2,497	598	4,067	647	86.4	355
26	ND	McKenzie Co	205	578	3.49	3.31	213	13	4,474	964	6,060	961	103	688
27	ND	McLean Co	1,908	10,357	2,911	2,349	24,428	153	7,588	1,734	11,053	1,748	179	1,206
28	ND	Mercer Co	3,974	45,350	3,334	2,904	91,617	588	5,111	768	3,341	576	96.4	1,085
29	ND	Morton Co	752	1,883	882	826	6,833	182	13,145	3,141	8,295	1,305	339	1,463
30	ND	Mountrail Co	0	0	0	0	0	0	5,348	1,897	6,831	1,113	195	803
31	ND	Nelson Co	0	0	0	0	0	0	2,670	752	6,055	949	89.6	381
32	ND	Oliver Co	1,100	22,845	1,390	1,256	28,565	241	1,717	374	2,573	425	46.1	271
33	ND	Pembina Co	568	758	193	78.7	730	145	8,051	1,889	8,196	1,284	275	817
34	ND	Pierce Co	0	0	0	0	0	0	2,344	1,110	5,630	924	138	570
35	ND	Ramsey Co	0	0	0	0	0	0	5,281	1,248	7,615	1,223	170	823
36	ND	Ransom Co	106	69	56.1	35.4	1.5	298	2,798	894	5,598	895	140	409
37	ND	Renville Co	0	0	0	0	0	0	2,627	992	5,270	875	102	390
38	ND	Richland Co	703	390	55.5	20.2	149	3	11,983	3,239	11,698	1,906	573	1,563
39	ND	Rollette Co	0	0	0	0	0	0	7,942	1,194	7,948	1,179	182	953
40	ND	Sargent Co	0	0	0	0	0	0	3,262	981	7,487	1,190	287	493
41	ND	Sheridan Co	0	0	0	0	0	0	1,893	626	3,952	655	69.2	386
42	ND	Sioux Co	0	0	0	0	0	0	2,362	355	2,875	362	55.5	328
43	ND	Slope Co	0	0	0	0	0	0	1,314	633	1,944	352	55.2	351
44	ND	Stark Co	60.5	180	0	0	0.3	17.5	11,710	3,396	6,239	1,019	399	1,471
45	ND	Steele Co	0	0	0	0	0	0	2,078	1,005	5,764	942	107	332
46	ND	Suetsman Co	0	0	0	0	0	0	12,048	4,131	11,090	1,852	380	1,679
47	ND	Towner Co	0	0	0	0	0	0	2,607	826	7,985	1,273	115	378
48	ND	Trail Co	684	446	126	53.1	479	15.5	7,800	1,855	10,296	1,603	167	845
49	ND	Walsh Co	0	0	0	0	0	0	8,114	1,892	9,819	1,555	291	1,006
50	ND	Ward Co	0	0	0	0	0	0	17,079	4,279	14,872	2,366	561	2,399
51	ND	Wells Co	0	0	0	0	0	0	3,959	1,943	9,669	1,546	187	549
52	ND	Williams Co	527	2,313	25.1	25.1	1,605	45.4	8,645	2,542	8,750	1,420	269	1,364
Grand Total			11,017	85,873	9,063	7,583	155,982	2,029	284,181	81,289	346,273	55,633	9,878	39,932

Grand Forks Co

CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
22,947	3,786	12,711	2,034	1,381	2,952

State of North Dakota Air Quality Control Region 172 (40 CFR 81.335)

SOURCE:
<http://www.epa.gov/air/data/geosel.html>
 USEPA - AirData NET Tier Report
 *Net Air pollution sources (area and point) in tons per year (2002)
 Site visited on 9 December 2009.

APPENDIX D

SPECIES OF CONSERVATION CONCERN AND STATE-LISTED BREEDING BIRDS AT GRAND FORKS AFB

List of Breeding Birds Documented at Grand Forks AFB

Breeding Birds
Northern Pintail
Canvasback
Redhead
Sharp-tailed Grouse
American Bittern
Northern Harrier
Cooper's Hawk
Swainson's Hawk
Upland Sandpiper
American Woodcock
Wilson's Phalarope
Franklins Gull
Forster's Tern
Short-eared Owl
Pileated Woodpecker
Black-billed Magpie
Sedge Wren
Grasshopper Sparrow
Le Conte's Sparrow
Nelson's Sharp-tailed Sparrow
Swamp Sparrow
Dickcissel
Bobolink
Eastern Bluebird
Scarlet Tanager
Clay-colored Sparrow

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APPENDIX E

LIST OF ALL FACILITIES ON GRAND FORKS AFB APPROACHING 50 YEARS OLD BY 2014

Table E-1. List of All Facilities on Grand Forks AFB Approaching 50 Years by 2014

Building Number	Structure Name	Construction Date	SHPO Concurrence
231	TLF	1957	
232	GODDARD HALL	1957	
402	PMP STN, LF	1957	
410	CIVIL ENGINEER SQUADRON	1957	
417	CE STOR OPEN	1957	
515	319 SFS HQ	1957	
522	CE PAV GRND FCLTY	1957	
523	MOBILITY/SAFETY/TRANS ALERT	1957	
528	BASE OPERATIONS	1957	
530	FIRE STATION	1957	NRHP-ineligible (June 22, 2009)
531	AIRFIELD LIGHTING VAULT	1957	
801	SAN SEWAGE PMP STN	1957	
802	BLDG WTR SUP	1957	
102	COMMUNICATIONS FACILITY	1958	
108	POST OFFICE/BITS/DSS	1958	
203	COMMUNITY ACTIVITIES CENTER	1958	
219	FREEDOM HALL	1958	
221	BUNCH HALL	1958	
222	GRAY HALL	1958	
501	PMP STN, LF	1958	
520	CE PAV GRND FCLTY	1958	
521	CE STORAGE	1958	
534	AFOSI	1958	
708	STOR, SEG MAG	1958	NRHP-ineligible (14 February 2008)
803	SOUTH GATE TRAFFIC CHECK HOUSE	1958	
870	RADAR FACILITY	1958	
871	ILS GLIDE SLOPE	1958	
872	ILS LOCALIZER	1958	
101	PERSONNEL & FINANCE	1959	
103	LAW ENFORCEMENT DESK	1959	
117	VQ	1959	
118	OFFICERS CLUB	1959	

Building Number	Structure Name	Construction Date	SHPO Concurrence
204	BASE THEATER	1959	
207	FAMILY SUPPORT	1959	
208	PRAIRIE ROSE CHAPEL	1959	
215	AIRMEN LEADERSHIP SCHOOL	1959	
233	319 SPTG HQ	1959	
307	319 ARW HQ	1959	
308	FITNESS CENTER	1959	
415	VEHICLE MAINTENANCE SHOP	1959	
512	319 SFS RESOURCE PROTECTION	1959	
600	MAINT DOCK, L/A	1959	
601	MAINT DOCK, L/A	1959	
602	MAINT DOCK, L/A	1959	
603	MAINT DOCK, L/A	1959	
607	LG & OG HQ	1959	
610	STOR, DELM WTR	1959	
701	SP ENTRY CON BLDG	1959	
702	MSL STG FAC	1959	NRHP-ineligible (14 February 2008)
703	STOR, MU-CUB MAG	1959	NRHP-eligible
704	STOR, MU-CUB MAG	1959	NRHP
705	STOR, MU-CUB MAG	1959	NRHP
706	STOR, MU-CUB MAG	1959	NRHP
707	STOR, MU-CUB MAG	1959	NRHP
709	STOR, IGLOO	1959	NRHP-ineligible (14 February 2008)
710	STOR, IGLOO	1959	NRHP-ineligible (14 February 2008)
711	STOR, IGLOO	1959	NRHP-ineligible (14 February 2008)
713	STOR, MU-CUB MAG	1959	
715	STOR SPARE INERT	1959	NRHP-ineligible (14 February 2008)
213	KOLLINGER HALL	1960	
217	EIELSON HALL	1960	
236	ROD & GUN CLUB	1960	
411	CE SHOPS, READINESS, MFH MAINT	1960	
413	VEHICLE MAINTENANCE SHOP	1960	

Building Number	Structure Name	Construction Date	SHPO Concurrence
624	STABLES BUILDING	1960	
717	STOR, MU-CUB MAG	1960	
414	VEHICLE OPS HEATED PARKING	1961	
516	PMEL	1961	
517	BASE SNOW REMOVAL CONTRACTOR	1961	
605	ACFT COR CON	1961	
609	SHP ACFT GEN PURP	1961	
621	SERVICES & OUTDOOR RECREATION	1961	
622	FABRICATION SHOP	1961	
109	MEDICAL CLINIC	1962	
202	BOWLING CENTER	1962	
303	REFUELING VEHICLE MAINTENANCE	1962	
613	MAINT DOCK, FL SYS	1962	
718	STOR SPARE INERT	1962	
1336	SAN SEWAGE PMP STN	1962	
1715	FAM HSG APPR 50-69	1964	
1719	FAM HSG APPR 50-69	1964	
1725	FAM HSG APPR 50-69	1964	
1729	FAM HSG APPR 50-69	1964	
1731	FAM HSG APPR 50-69	1964	
1739	FAM HSG APPR 50-69	1964	
1741	FAM HSG APPR 50-69	1964	
1743	FAM HSG APPR 50-69	1964	
1745	FAM HSG APPR 50-69	1964	
1747	FAM HSG APPR 50-69	1964	

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APPENDIX F

DOCUMENTATION ON NRHP ELIGIBILITY EVALUATIONS, SHPO CONCURRENCE, AND ACHP PROGRAM COMMENTS

Note: Photo attachments have been removed from correspondences.



Preserving America's Heritage

**PROGRAM COMMENT FOR
WORLD WAR II AND COLD WAR ERA (1939 – 1974)
AMMUNITION STORAGE FACILITIES**

I. Introduction

This Program Comment provides the Department of Defense (DoD) and its Military Departments with an alternative way to comply with their responsibilities under Section 106 of the National Historic Preservation Act with regard to the effect of the following management actions on World War II and Cold War Era ammunition storage facilities that may be eligible for listing on the National Register of Historic Places: ongoing operations, maintenance and repair, rehabilitation, renovation, mothballing, cessation of maintenance, new construction, demolition, deconstruction and salvage, remediation activities, and transfer, sale, lease, and closure of such facilities.

The term Ammunition Storage Facilities means all buildings and structures, listed in or eligible for listing in the National Register of Historic Places, that were designed and built as ammunition storage facilities within the years 1939-1974, regardless of current use, and that are identified by a DoD Category Group (2 digit) code of 42, Ammunition Storage (category code 42XXXX), in the Military Service's Real Property Inventory currently or at the time of construction. Table 1 (attached) provides all such buildings and structures associated with ammunition storage, by Military Department, that are applicable to this program comment.

In order to take into account the effects on Ammunition Storage Facilities, DoD and its Military Departments will conduct documentation in accordance with The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation. As each Military Department will be responsible for conducting its own mitigation actions, the following required documentation is structured by Military Department, followed by DoD-wide requirements.

II. Treatment of Properties

A. Army Mitigation

1. The Army shall expand and revise its existing context study, Army Ammunition and Explosives Storage in the United States, 1775-1945 to include the Cold War Era. This document provides background information and criteria for evaluating the historic significance of such buildings. The updated context study will:

identify the changes in ammunition storage during the Cold War;

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focus on the changes required for ammunition storage due to technological advancement in weaponry;

consider the importance of major builders, architects or engineers that may have been associated with design and construction of Ammunition Storage Facilities throughout the Army or at specific Army installations; and

describe the inventory of Ammunition Storage Facilities in detail, providing information on the various types of buildings and architectural styles and the quantity of each.

2. The Army shall undertake in-depth documentation on Ammunition Storage Facilities at nine installations. The existing context study concluded that the Army possessed “only a few basic types and an abundance of examples” of Ammunition Storage Facilities, due to the standardization of ammunition storage facilities beginning in the 1920s. The context study suggests that six geographically dispersed installations contain an array of primary examples of both aboveground and underground magazines with a high degree of integrity:

Hawthorne Army Depot, Nevada – early igloos;

McAlester Army Ammunition Plant, Oklahoma – Corbetta Beehive;

Pine Bluff Arsenal, Arkansas – biological and chemical igloos;

Ravenna Army Ammunition Plant, Ohio – standard World War II and aboveground magazines;

Blue Grass Army Ammunition Plant, Kentucky – standard World War II igloos and aboveground magazines; and

Louisiana Army Ammunition Plant, Louisiana – Stradley special weapons.

The Army shall document these six as well as three additional installations that possess Cold War Era Ammunition Storage Facilities. Documentation at the three additional installations will be determined after completion of the expanded context study described in section II.A.1., above. This study will include a brief history of the installation and the surrounding community, if appropriate, and a detailed history of the storage facilities and documentation of the buildings. The documentation will primarily consist of historic photographs and existing plans. Documentation will be tailored to address the different natures of aboveground and underground storage.

B. Navy Mitigation

1. The Navy will develop a supplemental context study that will be attached as an appendix to the Army’s existing context study, Army Ammunition and Explosives Storage in the United States, 1775-1945. The final product will be a separately bound volume of additional information and photographs and tabular appendices that, when presented with the Army’s and Air Force’s context studies, provide a clear picture of the Department of Defense’s Ammunition Storage facilities. This context study appendix will:

cover both World War II and the Cold War Era, from 1939-1974;

explore the changes in ammunition storage resulting from World War II;

examine the changes required for ammunition storage due to technological advancement in weaponry during the Cold War;

consider the importance of major builders, architects or engineers that may have been associated with design and construction of Ammunition Storage Facilities; and

describe the inventory of Ammunition Storage Facilities in detail, providing information on the various types of buildings and architectural styles and the quantity of each.

2. The Navy shall document a representative sample of the basic types of both aboveground and underground ammunition storage facilities. The Navy will choose three geographically dispersed installations with the greatest number and variety of such resources. The Marines will choose one such installation. The sample chosen shall be the best representative examples of the range of Ammunition Storage types constructed during World War II and the Cold War era. This documentation will include collecting existing plans and drawings, writing a historic description in narrative or outline format, and compiling existing historic photographs of the structures. Documentation will be tailored to address the different natures of aboveground and underground storage.

C. Air Force Mitigation

1. The Air Force will develop a supplemental context study that will be attached as an appendix to the Army's existing context study, Army Ammunition and Explosives Storage in the United States, 1775-1945. The final product will be a separately bound volume of additional information and photographs and tabular appendices that, when presented with the Army's and Navy's context studies, provide a clear picture of the Department of Defense's Ammunition Storage facilities. This context study appendix will:

cover the Cold War Era, from 1946-1974;

explore the changes in ammunition storage resulting from the Cold War;

examine the changes required for ammunition storage due to technological advancement in weaponry during the Cold War;

consider the importance of major builders, architects or engineers that may have been associated with design and construction of Ammunition Storage Facilities; and

describe the inventory of Ammunition Storage Facilities in detail, providing information on the various types of buildings and architectural styles and the quantity of each.

2. The Air Force shall document a representative sample of the basic types of both aboveground and underground ammunition storage facilities. The Air Force will choose three geographically dispersed installations with the greatest number and variety of such resources. The sample chosen shall be the best representative examples of the range of Ammunition Storage types constructed during the Cold War era. This documentation would include collecting existing plans and drawings, writing a historic description in narrative or outline format, and compiling existing historic photographs of the structures. Documentation will be tailored to address the different natures of aboveground and underground storage.

3. The Air Force will not be required to consider its World War II Era facilities in these mitigation actions. The Air Force was established in September 1947 and therefore was not associated with structures constructed during this era. Rather the Air Force has inherited its current inventory of 263 World War II Era Ammunition Storage facilities from former Army installations. Given the substantial

mitigation actions that will be undertaken by the Army to document its facilities, further documentation for the small number of similar facilities located at Air Force installations provides no additional historic value. While no documentation will be done on World War II facilities under the Air Force's control, all of the 263 facilities in its inventory are covered under this Program Comment.

D. DoD-Wide Mitigation

1. Copies of the documentation described above will be made available electronically, to the extent possible under security concerns, and hard copies will be placed in a permanent repository, such as the Center for Military History.
2. In addition, as a result of on-going consultations, each Military Department will provide a list of properties covered by the Program Comment, by State, to State Historic Preservation Officers, Tribal Historic Preservation Officers, and other interested parties, as appropriate. Each Military Department will be responsible for determining how to convey its information.
3. All Military Departments will encourage adaptive reuse of the properties as well as the use of historic tax credits by private developers under lease arrangements. Military Departments will also incorporate adaptive reuse and preservation principles into master planning documents and activities.

The above actions satisfy DoD's requirement to take into account the effects of the following management actions on World War II and Cold War Era ammunition storage facilities that may be eligible for listing on the National Register of Historic Places: ongoing operations, maintenance and repair, rehabilitation, renovation, mothballing, cessation of maintenance, new construction, demolition, deconstruction and salvage, remediation activities, and transfer, sale, lease, and closure of such facilities.

III. Applicability

A. 1. This Program Comment applies solely to Ammunition Storage Facilities as defined in Section I, above. The Program Comment does not apply to the following properties that are listed, or eligible for listing, on the National Register of Historic Places: (1) archeological properties, (2) properties of traditional religious and cultural significance to federally recognized Indian tribes or Native Hawaiian organizations, and/or (3) ammunition storage facilities in listed or eligible National Register of Historic Places districts where the ammunition storage facility is a contributing element of the district and the proposed undertaking has the potential to adversely affect such historic district. This third exclusion does not apply to historic districts that are made up solely of ammunition storage facility properties. In those cases the Program Comment would be applicable to such districts.

Since the proposed mitigation for the Ammunition Storage facilities documents site plans, building designs, and the spatial arrangement of ammunition storage facilities, along with the events and actions that lead to the development of standardized ammunition storage facilities in DoD, the important aspects of ammunition storage, whether single buildings or districts made up entirely of ammunition storage, will be addressed regardless of the type of undertaking that may affect this particular property type. The one currently known ammunition storage district, at Hawthorne Army Ammunition Plant, has been identified for further study, as outlined in Section II(A)(2) above.

2. An installation with an existing Section 106 agreement document in place that addresses ammunition storage facilities can choose to:

- (i) continue to follow the stipulations in the existing agreement document for the remaining period of the agreement; or

(ii) seek to amend the existing agreement document to incorporate, in whole or in part, the terms of this Program Comment; or

(iii) terminate the existing agreement document, and re-initiate consultation informed by this Program Comment if necessary.

3. All future Section 106 agreement documents developed by the Military Departments related to the undertakings and properties addressed in this Program Comment shall include appropriate provisions detailing whether and how the terms of this Program Comment apply to such undertakings.

IV. Completion Schedule

On or before 60 days following issuance of the Program Comment, DoD, its Military Department and ACHP will establish a schedule for completion of the treatments outlined above.

V. Effect of the Program Comment

By following this Program Comment, DoD and its Military Departments meet their responsibilities for compliance under Section 106 regarding the effect of the following management actions on World War II and Cold War Era ammunition storage facilities that may be eligible for listing on the National Register of Historic Places: ongoing operations, maintenance and repair, rehabilitation, renovation, mothballing, cessation of maintenance, new construction, demolition, deconstruction and salvage, remediation activities, and transfer, sale, lease, and closure of such facilities. Accordingly, DoD installations are no longer required to follow the case-by-case Section 106 review process for such effects. As each of the Military Departments is required under this Program Comment to document their own facilities, failure of any one Military Department to comply with the terms of the Program Comment will not adversely affect the other Departments' abilities to continue managing their properties under the Program Comment.

This Program Comment will remain in effect until such time as the Office of the Secretary of Defense determines that such comments are no longer needed and notifies ACHP in writing, or ACHP withdraws the comments in accordance with 36 CFR § 800.14(e)(6). Following such withdrawal, DoD and its Military Departments would be required to comply with the requirements of 36 CFR §§ 800.3 through 800.7 regarding the effects under this Program Comments' scope.

DoD, its Military Departments and ACHP will review the implementation of the Program Comment seven years after its issuance and determine whether to take action to terminate the Program Comment as detailed in the preceding paragraph.


John L. Nau, III
Chairman


Date

Attachment: Table

TABLE 1 - RPCS Hierarchy for Category Group 42

CG & Title	BC	BC Title	FAC	UM	FAC Title	MidDep	CAT CODE	UM AREA	UM OTH	UM ALT	CATCODE LONG NAME
42 - Ammunition Storage											
	421	Depot and Arsenal Ammunition Storage									
			4211	SF	Ammunition Storage, Depot and Arsenal						
						Army	42104	SF			EXPLOSIVE TRANSFER BUILDING, DEPOT LEVEL
						Army	42107	SF			STRADLEY, NONATOMIC BLAST RESISTANT, DEPOT LEVEL
						Army	42110	SF			FUSE AND DETONATOR MAGAZINE, DEPOT LEVEL
						Army	42120	SF			HIGH EXPLOSIVE MAGAZINE, DEPOT LEVEL
						Army	42150	SF			SMOKELESS POWDER MAGAZINE, DEPOT LEVEL
						Army	42160	SF			SPECIAL WEAPONS MAGAZINE, DEPOT LEVEL
						Army	42170	SF			GUIDED MISSILE MAGAZINE, DEPOT LEVEL
						Army	42180	SF			IGLOO STORAGE, DEPOT LEVEL
						Army	42181	SF			AMMUNITION STOREHOUSE, DEPOT LEVEL
						Army	42182	SF			SMALL ARMS AMMUNITION MAGAZINE, DEPOT LEVEL
						Army	42183	SF			GENERAL PURPOSE MAGAZINE, DEPOT LEVEL
						Army	42184	SF			AMMUNITION HUT, DEPOT LEVEL
						Army	42186	SF			AMMUNITION STORAGE STRUCTURE, DEPOT LEVEL
						Army	42288	SF			AMMO STORAGE OTHER THAN DEPOT OR UNIT
						Navy	42112	SF		CF	FUSE&DETONATOR MAGAZINE
						Navy	42122	SF		CF	HIGH-EXPLOSIVE MAGAZINE
						Navy	42132	SF		CF	INERT STOREHOUSE
						Navy	42142	SF		CF	SMOKEDRUM STOREHOUSE
						Navy	42148	SF		CF	SMALL-ARMS PYROTECHNIC MAGAZINE
						Navy	42152	SF		CF	SMOKELESS-POWDER-PROJECTILE MAGAZINE
						Navy	42162	SF		CF	SPECIAL-WEAPONS MAGAZINE
						Navy	42172	SF		CF	MISSILE MAGAZINE

4212 SF Intercontinental Ballistic Missile Storage Facility

422 Installation and Ready Issue Ammunition Storage

4221 SF Ammunition Storage, Installation

SUBMARINE LAUNCHED BALLISTIC MISSILE STORAGE FACILITY

Navy 42182 SF

Air Force	422253	SF	STORAGE, MULTI-CUBICLE MAGAZINE
Air Force	422256	SF	STORAGE, ROCKET CHECKOUT AND ASSEMBLY
Air Force	422257	SF	STORAGE SEGREGATED MAGAZINE
Air Force	422258	SF	STORAGE MAGAZINE ABOVE GROUND TYPE A, B, & C
Air Force	422259	SF	MISSILE STORAGE FACILITY
Air Force	422264	SF	STORAGE IGLOO
Air Force	422271	SF	STORAGE, MODULE BARRICADED
Air Force	422273	SF	STORAGE IGLOO STEEL ARCH UNDERPASS
Army	42210	SF	FUSE AND DETONATOR MAGAZINE, INSTALLATION
Army	42215	SF	HIGH EXPLOSIVE MAGAZINE, INSTALLATION
Army	42225	SF	SMOKEDRUM STOREHOUSE, INSTALLATION
Army	42230	SF	SMALL ARMS AMMUNITION AND PYROTECHNICS MAGAZINE, INSTALLATION
Army	42231	SF	AMMUNITION STOREHOUSE, INSTALLATION
Army	42235	SF	READY MAGAZINE, INSTALLATION
Army	42240	SF	FIXED AMMUNITION MAGAZINE, INSTALLATION
Army	42250	SF	SPECIAL WEAPONS MAGAZINE, INSTALLATION
Army	42260	SF	GUIDED MISSILE MAGAZINE, INSTALLATION
Army	42280	SF	IGLOO STORAGE, INSTALLATION
Army	42281	SF	AMMUNITION HUT, INSTALLATION
Army	42283	SF	GENERAL PURPOSE MAGAZINE, INSTALLATION
Army	42285	SF	UNIT SMALL ARMS AMMUNITION STORAGE, INSTALLATION
Army	42286	SF	AMMUNITION STORAGE STRUCTURE, INSTALLATION

EA



Preserving America's Heritage

PROGRAM COMMENT FOR COLD WAR ERA UNACCOMPANIED PERSONNEL HOUSING (1946 – 1974)

I. Introduction

This Program Comment provides DoD, and its Military Departments with an alternative way to comply with their responsibilities under Section 106 of the National Historic Preservation Act with regard to the effect of the following management actions on Cold War Era Unaccompanied Personnel Housing (UPH) that may be listed or eligible for listing on the National Register of Historic Places: ongoing operations, maintenance and repair, rehabilitation, renovation, mothballing, cessation of maintenance, new construction, demolition, deconstruction and salvage, remediation activities, and transfer, sale, lease, and closure of such facilities.

The term UPH means all buildings and structures, listed or eligible for listing on the National Register of Historic Places, that were designed and built as UPH in the years 1946-1974, regardless of use. This will be all such buildings and structures with the DoD Category Group (2 digit) Code of 72, Unaccompanied Personnel Housing, in the Military Service's Real Property Inventory currently or at the time of construction. Buildings in Category Group Code 72 include UPH and associated buildings and structures such as dining halls and laundry facilities constructed to support military housing needs. Table 1 (attached) provides all such buildings and structures, by Military Department, that are applicable to this program comment.

In order to take into account the effects on such UPH, DoD and its Military Departments will conduct documentation in accordance with The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation. As each Military Department will be responsible for conducting its own mitigation actions, the following required documentation is structured by Military Department, followed by DoD-wide requirements.

II. Treatment of Properties

A. Army Mitigation

1. In 2003, the Army completed a study entitled Unaccompanied Personnel Housing (UPH) During the Cold War (1946-1989). This Historic Context study was undertaken to support the analysis of real property related to Army UPH, and to support the identification and evaluation of historic properties. In addition to providing historic information regarding the UPH program, the study also documents the property types defined in their historic context. In-depth archival research of primary and secondary sources was undertaken on the organizational history, doctrines, and policies that influenced the design and development of Army UPH during the Cold War era. Data were collected to identify significant events and policies that influenced site plans, building design, and spatial arrangement of Army UPH

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facilities. Archival research was also directed to compile data on the evolution and modification of these property types over time. In addition, site visits to six Army installations containing UPH facilities were completed. The installations were examined to identify and document UPH-related property types based on extant real property in the Army inventory. These case studies included a summary installation history, interview data from the cultural resource management, a review of extant real property, and a detailed architectural analysis of the design, materials, construction and modification of over 700 examples of Army UPH. The resulting report provides a comprehensive and detailed record of Army UPH, including a collection of site plans, as-built building plans, and photographs (Chapter 4). Since these standard designs have already been well documented, no additional documentation of the Army's UPH is needed as part of the overall DoD mitigation. However, the Army should verify and document, as necessary, any building types and structures included on Table 1 that may not have been included in Unaccompanied Personnel Housing (UPH) During the Cold War (1946-1989).

2. The Army, in order to take into account effects on potentially historic UPH, will amend Unaccompanied Personnel Housing (UPH) During the Cold War (1946-1989) in order to make it available to a wider audience. Due to security concerns, the distribution of the context study is limited to US Government Agencies Only. The Army will remove the elements of the document that are security risks and then make the context available to DoD for consolidation with information gathered on Navy and Air Force UPH as required by Section II(D)(2), below..

B. Navy Mitigation

1. The Navy will produce a supplemental context study appendix that will be attached as an appendix to the Army's Unaccompanied Personnel Housing (UPH) During the Cold War (1946-1989). The final product will be a separately bound volume of additional information and photographs and tabular appendices that, when taken with the Army's and Air Force's context studies, provide a clear picture of the DoD's UPH. The context study appendix will:

- explore the post-World War II changing demographics of Navy personnel and its impact on housing needs;

- amend, as necessary, and adopt the Army's criteria for evaluating the historic significance of UPH;

- consider the importance of major builders, developers and architects that may have been associated with design and construction of UPH; and

- describe the inventory of UPH in detail, providing information on the various types of buildings and architectural styles and the quantity of each.

2. The Navy shall document a representative sample of the basic types of UPH. The Navy will choose three geographically dispersed installations with the greatest number and variety of such resources. The Marine Corps will choose one such example. The sample chosen shall be the best representative examples of the range of UPH types constructed during the Cold War era. This documentation would include collecting existing plans and drawings, writing a historic description in narrative or outline format, and compiling historic photographs of the buildings (similar in scope to the Army's documentation).

C. Air Force Mitigation

1. The Air Force will produce a supplemental context study appendix that will be attached to the Army's Unaccompanied Personnel Housing (UPH) During the Cold War (1946-1989). The final product will be a

separately bound volume of additional information and photographs and tabular appendices that, when taken with the Army's and Navy's context studies, provide a clear picture of the Department of Defense's UPH. The context study appendix will:

- explore the post-World War II changing demographics of Air Force personnel and its impact on housing needs;

- amend, as necessary, and adopt the Army's criteria for evaluating the historic significance of UPH;

- consider the importance of major builders, developers and architects that may have been associated with design and construction of UPH; and

- describe the inventory of UPH in detail, providing information on the various types of buildings and architectural styles and the quantity of each.

The Air Force shall include documentation of representative sampling of the basic types of UPH. The Air Force will choose three geographically dispersed installations with the greatest number and variety of such resources. The sample chosen shall be the best representative examples of the range of UPH types constructed during the Cold War era. This documentation would include collecting existing plans and drawings, writing a historic description in narrative or outline format, and compiling historic photographs of the buildings, and would be similar in scope to the Army's documentation.

D. DoD-Wide Mitigation

1. Additionally, DoD recently completed a draft context study entitled The Built Environment of Cold War Era Servicewomen through the Legacy Resource Management Program. This context study examines how the needs of women service members shaped construction plans and practices of several types of facilities, including UPH. The Legacy Program recently approved funds for the completion of this document. The legacy program will make the context study available to the Military Departments and the public to enhance the consideration and documentation of the UPH story.

2. DoD and its Military Departments will make copies of all documentation available electronically, to the extent possible under security concerns, and hard copies will be placed in a permanent repository, such as the Center for Military History. DoD will consolidate information from the Navy and Air Force documentation with the context provided by the Army, as required by Section II(A)(2) above, and make it available for public distribution.

3. As a result of on-going consultations with stakeholders, each Military Department will provide a list of its UPH properties covered by the Program Comment, by State, to stakeholders. Each Military Department will be responsible for determining how to convey its information.

4. All Military Departments will encourage adaptive reuse of UPH properties as well as the use of historic tax credits by private developers under lease arrangements. Military Departments will also incorporate adaptive reuse and preservation principles into master planning documents and activities.

These actions satisfy DoD's requirement to take into account the effects of the following management actions on DoD UPH that may be listed or eligible for listing on the National Register of Historic Places: ongoing operations, maintenance and repair, rehabilitation, renovation, mothballing, ceasing maintenance activities, new construction, demolition, deconstruction and salvage, remedial activities, and transfer, sale, lease, and closure.

III. Applicability

A. This Program Comment applies solely to Cold War Era DoD UPH as defined in Section I, above. The Program Comment does not apply to the following properties that are listed, or eligible for listing, on the National Register of Historic Places: (1) archeological properties, (2) properties of traditional religious and cultural significance to federally recognized Indian tribes or Native Hawaiian organizations, and/or (3) UPH in listed or eligible National Register of Historic Places districts where the UPH is a contributing element of the district and the proposed undertaking has the potential to adversely affect such historic district. This exclusion does not apply to historic districts that are made up solely of UPH properties. In those cases the Program Comment would be applicable to such districts.

Since the proposed mitigation for UPH documents site plans, building designs, and the spatial arrangement of UPH, along with the events and actions that lead to the development of UPH, the important aspects of UPH, whether single buildings or districts made up entirely of UPH, will be addressed regardless of the type of undertaking that may affect this particular property type.

B. An installation with an existing Section 106 agreement document in place that addresses UPH can choose to:

- (1) continue to follow the stipulations in the existing agreement document for the remaining period of the agreement; or
- (2) seek to amend the existing agreement document to incorporate, in whole or in part, the terms of this Program Comment; or
- (3) terminate the existing agreement document, and re-initiate consultation informed by this Program Comment if necessary.

C. All future Section 106 agreement documents developed by the Military Departments related to the undertakings and properties addressed in this Program Comment shall include appropriate provisions detailing whether and how the terms of this Program Comment apply to such undertakings.

IV. Completion Schedule

On or before 60 days following approval of the Program Comment, DoD, its Military Departments and ACHP will establish a schedule for completion of the treatments outlined above.

V. Effect of the Program Comment

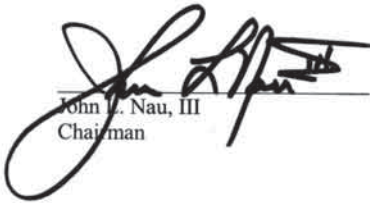
By following this Program Comment, DoD and its Military Departments meet their responsibilities for compliance under Section 106 regarding the effect of the following management actions on Cold War era DoD UPH that may be listed or eligible for listing on the National Register of Historic Places: ongoing operations, maintenance and repair, rehabilitation, renovation, mothballing, ceasing maintenance activities, new construction, demolition, deconstruction and salvage, remedial activities, and transfer, sale, lease, and closure. Accordingly, DoD installations are no longer required to follow the case-by-case Section 106 review process for such effects.

As each of the Military Departments is required under this Program Comment to document their own facilities, failure of any one Military Department to comply with the terms of the Program Comment will not adversely affect the other Departments' abilities to continue managing their properties under the Program Comment.

VI. Duration and Review of the Program Comment

This Program Comment will remain in effect until such time as DoD or its individual Military Departments determine that such comments are no longer needed and notifies ACHP in writing, or ACHP withdraws the comments in accordance with 36 CFR § 800.14(e)(6). Following such withdrawal, DoD or its individual Military Departments would be required to comply with the requirements of 36 CFR §§ 800.3 through 800.7 regarding the effects under this Program Comments' scope.

DoD, its Military Departments and ACHP will review the implementation of the Program Comment seven years after its issuance and determine whether to take action to terminate the Program Comment as detailed in the preceding paragraph.



John L. Nau, III
Chairman



August 18, 2006
Date

Attachment: Table 1

TABLE 1 - RPCS Heirarchy for Category Group 72

CG & Title	BC	BC Title	FAC	UM	FAC Title	MilDep	CAT CODE	UM AREA	UM OTH	UM ALT	CATCODE LONG NAME
- 72 - Unaccompanied Personnel Housing											
	721	Enlisted Unaccompanied Personnel Housing									
			7210	SF	Enlisted Unaccompanied Personnel Housing						
						Air Force	721312	SF	PN		DORMITORY AIRMAN PERMANENT PARTY/PCS-STUDENT
						Air Force	721313	SF	PN		TECHNICAL TRAINING STUDENT HOUSING
						Air Force	721314	SF	PN		DORMITORY, UNACCOMPANIED NCO
						Army	72111	SF	SP		ENLISTED UNACCOMPANIED PERSONNEL HOUSING
						Army	72170	SF	SP		UNACCOMPANIED PERSONNEL HOUSING, SENIOR NCO
						Navy	72111	SF	PN		BACHELOR ENLISTED QUARTERS E1/E4
						Navy	72112	SF	PN		BACHELOR ENLISTED QUARTERS E5/E6 (MARINE CORPS E-5 ONLY)
						Navy	72113	SF	PN		BACHELOR ENL QTRS-MARINES E1/E4
						Navy	72124	SF	PN		BACHELOR ENL QTRS-MARINES E5
						Navy	72125	SF	PN		BACHELOR ENL QTRS-MARINES E6/E9
						Navy	72126	SF	PN		CIVILIAN BARRACKS -GS 01 THRU 06
						Navy	72130	SF	PN		CIVILIAN BARRACKS-BASE OPERATING SUPPORT CONTRACTOR
						Navy	72131	SF	PN		BERTHING-NAVAL HOME
						Navy	72146	SF	PN		

7212	SF	Enlisted Unaccompanied Personnel Housing, Transient	Air Force	721315	SF	PN	DORMITORY VISITING AIRMAN QUARTERS
				72121	SF	PN	BACHELOR ENL QTRS-TRANSIENT E1/E4
				72122	SF	PN	BACHELOR ENL QTRS-TRANSIENT E5/E6
				72123	SF	PN	BACHELOR ENL QTRS-TRANSIENT E7/E9
				72153	SF	PN	TRANSIENT PERSONNEL UNIT BARRACKS E7-E9
7213	SF	Student Barracks	Army	72121	SF	SP	TRANSIENT UPH, ADVANCED INDIVIDUAL TRAINEES (AIT)
				72122	SF	SP	TRANSIENT UPH, ADVANCED SKILLS TRAINEES (AST)
				72114	SF	PN	CLASS A STUDENT BARRACKS
				72117	SF	PN	OFFICER CANDIDATE SCHOOL (OCS)
				72118	SF	PN	NAVAL ACADEMY PREPARATORY SCHOOL (NAPS)
				72119	SF	PN	BROADENED OPPORTUNITY FOR OFFICER SELECTION TRNG (BOOST)
				72424	SF	PN	OFFICER INDOCTRINATION SCHOOL (OIS)
7214	SF	Annual Training/Mobilization Barracks	Army	72114	SF	SP	ENLISTED BARRACKS, TRANSIENT TRAINING
				72115	SF	SP	ENLISTED BARRACKS, MOBILIZATION
7218	SF	Recruit/Trainee Barracks	Air Force	721311	SF	PN	RECRUITS DORMITORY
				72181	SF	SP	TRAINEE BARRACKS
				72115	SF	PN	RECRUIT-TYPE BARRACKS
722		Unaccompanied Personnel Housing Mess Facilities	Army				

7233	SF	Dining Support Facility	Navy	72340	SF	VE	GARAGES DETACHED -BACHELOR HOUSING
			Air Force	723385	SF		KITCHEN, CENTRAL PREPARATION
			Air Force	723388	SF		FLIGHT KITCHEN
			Navy	72250	SF	NS	COLD-STORAGE -DETACHED-FROM-GALLEY
7234	SF	Latrine/Shower Facility				SH	
			Air Force	714124	SF		ATTENDANTS SANITARY FACILITIES
			Air Force	723392	SF		SANITARY LATRINE
			Navy	72320	SF	PN	LATRINE DETACHED
7235	EA	Miscellaneous UPH Support Facility					
			Air Force	750663		EA	PRIVATELY OWNED VEHICLE WASHRACK
			Navy	72350		EA	WASH-RACK DETACHED
			Navy	72361		EA	TROOP-HOUSING -OTHER DETACHED FACILITIES
7240	SF	Officer Unaccompanied Personnel Housing					
			Air Force	724415	SF	PN	OFFICERS' QUARTERS
			Air Force	724433	SF	PN	CADET QUARTERS
			Army	72410	SF	PN	UNACCOMPANIED OFFICERS QUARTERS, MILITARY
			Navy	72411	SF	PN	BACHELOR OFFICERS' QUARTERS PERMANENT PARTY W1/W2 & 01/02
			Navy	72412	SF	PN	BACHELOR OFFICERS QUARTERS PERMANENT PARTY W3-W5 & 03UP
			Navy	72422	SF	PN	CIVILIAN QUARTERS -GS 07 AND ABOVE
			Navy	72423	SF	PN	CIVILIAN QUARTERS-BASE OPERATING SUPPORT CONTRACTOR



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CEV —
CEC — info*

ND SHPO 06-1116: possible demolition/removal of 325 housing structures built 1962, 1964, and 1976, and 7 generic bus shelters, Grand Forks Air Force Base, North Dakota

Dear Ms. Giltner;

We reviewed ND SHPO 06-1116: possible demolition of 325 housing structures built 1962, 1964, and 1976, and 7 generic bus shelters, Grand Forks Air Force Base, North Dakota, and concur with a "No Historic Properties Affected" determination, provided the project is of the nature specified and takes place in the legal description outlined and mapped in the draft report.

Any borrow fill involved in the moving or demolition of these structures must come from an approved source, that is a source surveyed by an archaeologist and found to contain no significant cultural resources.

If you have any questions please contact Susan Quinnell, at (701) 328-3576 or squinnell@nd.gov

Sincerely,

Merlan E. Paaverud, Jr.
State Historic Preservation Officer (North Dakota)



**STATE
HISTORICAL
SOCIETY
OF NORTH DAKOTA**

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Department of
Transportation

Merlan E. Paaverud, Jr.
Director

Accredited by the
American Association
of Museums

July 10, 2009

Mary Giltner
Deputy Base Civil Engineer
319 CES/CEVA
525 Tuskegee Airmen Blvd
Grand Forks AFB ND 58205-6434

MC6

CEA

**ND SHPO 97-0527CB: Demolish existing buildings 432 and 437, Grand Forks
Air Force Base, North Dakota**

Dear Ms. Giltner,

We reviewed ND SHPO 97-0527CB: Demolish existing buildings 432 and 437,
Grand Forks Air Force Base, North Dakota and concur with a "No Historic
Properties Affected" determination, provided the project is of the nature specified
and takes place in the legal description outlined and mapped in your e-mail.

If you have any questions please contact Susan Quinnell, at (701) 328-3576 or
squinnell@nd.gov

Sincerely,

Merlan E. Paaverud, Jr.
State Historic Preservation Officer (North Dakota)



DEPARTMENT OF THE AIR FORCE
319TH CIVIL ENGINEER SQUADRON
GRAND FORKS AIR FORCE BASE, NORTH DAKOTA

319 CES/CD
525 Tuskegee Airmen Blvd
Grand Forks AFB ND 58205-6434

JUL 6 2009

Merlan E Paaverud
State Historic Preservation Officer
State Historical Society of North Dakota
612 East Boulevard Ave
Bismarck ND 58505-0200

RE: Demolition of Buildings 432 and 437

Dear Mr. Paaverud:

The Grand Forks AFB plans to demolish buildings 432 and 437. Please see attached photographs of the structures for your review. Buildings 432 and 437 are currently vacant and have been identified as excess building space on the installation due to changing mission needs. Building 432 was constructed in 1969 and Building 437 was built in 1971. Both structures served as Defense Reutilization and Marketing Organization (DRMO) Supply and Equipment Warehouses. Materials for both buildings are the same consisting of concrete foundations and floors, and metal roofs and walls. Initial dimensions for building 432 were 40' x 100', and in 1979 an addition was constructed adding approximately 847 sq feet. Dimensions of Building 437 are 30' by 36'. Both buildings are common and were used for typical base operations.

These facilities are deteriorating, beyond their useful life, and costly to maintain. No other alternate use for each subject building was identified. Demolition plans include the building structure, excavation, removal of foundations, disposal of all debris off site, capping or disconnecting all utilities, and site restoration.

GFAFB suggests that demolition of these structures would result in a finding of "No Historic Properties Affected". We request concurrence from your office.

Should you have any questions or need additional information please call/email our Cultural Resources Manager, Ms. Kristen Rundquist, at (701) 747-4774 or kristen.rundquist@grandforks.af.mil.

Sincerely,


MARY C. GILTNER
Deputy Base Civil Engineer

Attachment:
Photos



DEPARTMENT OF THE AIR FORCE
319TH CIVIL ENGINEER SQUADRON
GRAND FORKS AIR FORCE BASE, NORTH DAKOTA

319 CES/CD
525 Tuskegee Airmen Blvd
Grand Forks AFB ND 58205-6434

APR 1 2010

Merlan E Paaverud
State Historic Preservation Officer
State Historical Society of North Dakota
612 East Boulevard Ave
Bismarck ND 58505-0200

RE: Munitions Storage Area Building Demolition

Dear Mr. Paaverud,

Correspondence dated December 8, 2009 from your office indicated you did not have the Program Comment (PC) for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities. Please find the PC attached along with the federal register notice by the Advisory Council on Historic Preservation adopting the document for your review. A notice from the Air Force was sent to all SHPO's on Mar 29, 2007 about this PC, and identifies 23 buildings in the Grand Forks AFB munitions storage area including buildings 703, 704, 705, 706, and 707. The PC allows for ongoing operations by the Air Force to include demolition, and Grand Forks AFB is currently planning disposal of buildings 703 and 704. We are further planning to reuse buildings 705-707 for storage of small munitions. Our intention is to operate under the PC for these structures.

Further correspondence via email with Ms Susan Quinnell, Review and Compliance Coordinator, dated Feb 1, 2010 indicates that building 714 is considered historic and that demolition of this structure is an adverse effect. We submit that mitigation for this adverse effect can be accounted for with the HABS/HAER documentation of the artwork in building 714 agreed to under the Programmatic Agreement for the Deactivation of the 321st Missile Group signed December 2005. The HABS/HAER documentation is complete and residing at the Library of Congress visible on their website. Grand Forks AFB requires demolition of building 714 as we cannot find a suitable reuse of the structure, it does not meet mission requirements, and the structure is expensive to maintain. As such we seek concurrence from your office that suitable mitigation has been made and that the proposed demolition of building 714 is approved by your office.

One more building has been added to the munitions storage area demolition project, building 738. The foundation and floor are concrete and the walls and roof are corrugated metal. It was constructed in 1982 with 8951 square footage. Building 738 served as a vehicle maintenance and inert storage area, and is currently vacant. Please find attached photos of this building for your review. We cannot find a suitable reuse of the building, it does not meet mission requirements, and the structure is expensive to retain. Grand Forks AFB suggests that

demolition of this structure would result in a finding of "No Historic Properties Affected". We request concurrence from your office providing for the demolition of building 738.

Our request to demolish additional buildings (712, 717, 719, 723, 724, 725, 726, 727, 729, 737, and 751) on Nov 20, 2009 was not referenced in your return reply of Dec 8, 2009. After review of the PC, it is noted that these buildings are also covered under this section 106 consultation tool, except 729 and 751. Our intention is to operate under the PC for these allowable structures, and suggest that demolition of buildings 729 and 751 would result in a finding of "No Historic Properties Affected". We request concurrence from your office on this finding.

We recognize this project has undergone multiple iterations. For purposes of clarity, please find the complete list of buildings planned for demolition and retention in the munitions storage area, indicating our correspondence log with decisions made along with an updated map. We appreciate your patience in helping us work through this project.

Should you have any questions or need additional information please call/email our Cultural Resources Manager, Ms. Kristen Rundquist, at (701) 747-4774 or kristen.rundquist@grandforks.af.mil.

Sincerely,


MARY O. GILTNER
Deputy Base Civil Engineer

7 Attachments:

1. Proposed Building Demolition and Correspondence Log
2. Map of the Munitions Storage Area
3. Photos of Building 738
4. Past Correspondence
5. SHPO Notice, Federal Register Document & Program Comment of Ammunition Facilities
6. Programmatic Agreement For The Deactivation of 321st Missile Group
7. HABS/HAER Library of Congress Documentation for Building 714 Artwork

Building Number	Historic Status	SHPO Correspondence	Built Date	Building Description	AF Intent
701	Never Evaluated		1959	SECURITY POLICE ENTRY CONTROL BUILDING	Retain
702	Covered Under Program Comment For Ammunition Storage Facilities	3/28/2000 and Feb 14, 2008 (no affect concurrence)	1959	MISSILE STORAGE FACILITY	Demolish
703	Covered Under Program Comment For Ammunition Storage Facilities	9/1/1996, Feb 14, 2008, Dec 8, 2009	1959	STORAGE, MULTI-CUBICLE MAGAZINE	Demolish
704	Covered Under Program Comment For Ammunition Storage Facilities	9/1/1996, Feb 14, 2008, Dec 8, 2009	1959	STORAGE, MULTI-CUBICLE MAGAZINE	Demolish
705	Covered Under Program Comment For Ammunition Storage Facilities	9/1/1996, Feb 14, 2008, Dec 8, 2009	1959	STORAGE, MULTI-CUBICLE MAGAZINE	Retain
706	Covered Under Program Comment For Ammunition Storage Facilities	9/1/1996, Feb 14, 2008, Dec 8, 2009	1959	STORAGE, MULTI-CUBICLE MAGAZINE	Retain
707	Covered Under Program Comment For Ammunition Storage Facilities	9/1/1996, Feb 14, 2008, Dec 8, 2009	1959	STORAGE, MULTI-CUBICLE MAGAZINE	Retain
708	Covered Under Program Comment For Ammunition Storage Facilities	2/14/2008 (no affect concurrence)	1958	STORAGE SEGREGATED MAGAZINE	Demolish
709	Covered Under Program Comment For Ammunition Storage Facilities	2/14/2008 (no affect concurrence)	1959	STORAGE IGLOO	Demolish
710	Covered Under Program Comment For Ammunition Storage Facilities	2/14/2008 (no affect concurrence)	1959	STORAGE IGLOO	Demolish
711	Covered Under Program Comment For Ammunition Storage Facilities	2/14/2008 (no affect concurrence)	1959	STORAGE IGLOO	Demolish
712	Covered Under Program Comment For Ammunition Storage Facilities		1955	STORAGE IGLOO	Demolish
713	Covered Under Program Comment For Ammunition Storage Facilities	2/14/2008 (no affect concurrence)	1959	STORAGE, MULTI-CUBICLE MAGAZINE	Demolish
714	Potentially Eligible	9/1/1996, Feb 14, 2008, Dec 8, 2009	1971	RE-ENTRY VEHICLE BUILDING	Demolish
715	Covered Under Program Comment For Ammunition Storage Facilities	2/14/2008 (no affect concurrence)	1959	INERT SPARES STORAGE	Demolish
717	Covered Under Program Comment For Ammunition Storage Facilities		1960	STORAGE MAGAZINE ABOVE GROUND TYPE A, B, AC	Demolish
718	Covered Under Program Comment For Ammunition Storage Facilities	8/31/1999, 2/14/2008 (no affect concurrence)	1962	INERT SPARES STORAGE	Demolish
719	Covered Under Program Comment For Ammunition Storage Facilities		1955	STORAGE IGLOO	Demolish
720	Covered Under Program Comment For Ammunition Storage Facilities	2/14/2008 (no affect concurrence)	1955	STORAGE SEGREGATED MAGAZINE	Demolish
721	Never Evaluated	2/14/2008 (no affect concurrence)		Metal Shed near 714, 60 sq ft	Demolish
722	Never Evaluated	2/14/2008 (no affect concurrence)	1971	VEHICLE OPERATIONS HEATED PARKING	Demolish
723	Covered Under Program Comment For Ammunition Storage Facilities		1971	STORAGE IGLOO	Demolish
724	Covered Under Program Comment For Ammunition Storage Facilities		1971	STORAGE IGLOO	Demolish
725	Covered Under Program Comment For Ammunition Storage Facilities		1972	STORAGE IGLOO	Retain
726	Covered Under Program Comment For Ammunition Storage Facilities		1972	STORAGE IGLOO	Retain

727 Covered Under Program Comment For Ammunition Storage Facilities		1972 STORAGE IGLOO	Retain
728 Never Evaluated	2/14/2008 (no affect concurrence)	1976 TOWER/LOOKOUT -- MASTER SURVEILLANCE AND CONTROL FACILITY	Demolish
729 Never Evaluated		1980 ELECTRIC POWER STATION BUILDING	Demolish
730 Never Evaluated	2/14/2008 (no affect concurrence)	1972 SHOP. CONVENTIONAL MUNITIONS	Demolish
731 Covered Under Program Comment For Ammunition Storage Facilities	2/14/2008 (no affect concurrence)	1971 STORAGE SEGREGATED MAGAZINE	Demolish
732 Never Evaluated	2/14/2008 (no affect concurrence)	Utility Block Bldg near 714. 50 sq ft	
733 Never Evaluated	2/14/2008 (no affect concurrence)	1980 RESERVE FIRE TEAM FACILITY	Demolish
737 Determined Not Eligible	31/Aug/1999	1982 INTERATED MAINTENANCE FACILITY	Demolish
738 Never Evaluated		1982 INERT SPARES STORAGE	Demolish
739 Never Evaluated	2/14/2008 (no affect concurrence)	1982 STORAGE IGLOO	Retain
740 Never Evaluated	2/14/2008 (no affect concurrence)	1982 STORAGE IGLOO	Retain
741 Never Evaluated	2/14/2008 (no affect concurrence)	1982 STORAGE IGLOO	Retain
742 Never Evaluated	2/14/2008 (no affect concurrence)	1982 STORAGE IGLOO	Retain
743 Never Evaluated	2/14/2008 (no affect concurrence)	1982 STORAGE IGLOO	Retain
744 Never Evaluated	2/14/2008 (no affect concurrence)	1982 STORAGE IGLOO	Retain
745 Never Evaluated	2/14/2008 (no affect concurrence)	1982 STORAGE IGLOO	Retain
746 Never Evaluated	2/14/2008 (no affect concurrence)	1982 STORAGE IGLOO	Retain
747 Never Evaluated	2/14/2008 (no affect concurrence)	1982 ELECTRIC POWER STATION BUILDING	Retain
748 Never Evaluated	2/14/2008 (no affect concurrence)	1982 ELECTRIC POWER STATION BUILDING	Retain
749 Never Evaluated	2/14/2008 (no affect concurrence)	1982 ELECTRIC POWER STATION BUILDING	Retain
750 Never Evaluated	2/14/2008 (no affect concurrence)	1982 ELECTRIC POWER STATION BUILDING	Retain
751 Never Evaluated		Metal Shed near 714. 50 sq ft	Demolish
761 Never Evaluated	2/14/2008 (no affect concurrence)	1988 VEHICLE OPERATIONS HEATED PARKING	Retain

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APPENDIX G

MANAGEMENT REQUIREMENTS AND ENVIRONMENTAL PROTECTION MEASURES FOR WETLANDS AND OTHER WATERS OF THE UNITED STATES

**MANAGEMENT REQUIREMENTS AND
ENVIRONMENTAL PROTECTION MEASURES
FOR WETLANDS AND OTHER WATERS
OF THE UNITED STATES**

GRAND FORKS AFB, NORTH DAKOTA

MAY 2010

1. Introduction

Grand Forks Air Force Base (AFB) has prepared an Installation Development Environmental Assessment (IDEA) to implement 319th Air Refueling Wing- (319 ARW) approved plans for installation development requirements. These plans propose demolition, construction, and infrastructure improvement activities intended to ensure that the installation can sustain its current and future national security operations and mission-readiness status. These projects include installation development projects contained in the *General Plan: Grand Forks Air Force Base, ND*, and the community of all existing 319 ARW-approved development plans.

The IDEA provides a constraints-based environmental impact analysis of installation development actions projected over the next 5 years (from fiscal year 2010 through 2014). A potential constraint to installation development actions are wetlands or other waters of the United States that exist at Grand Forks AFB. The purpose of this document is to provide management tools to avoid or minimize any direct or indirect adverse effects that could potentially occur on wetlands or other waters of the United States due to implementation of the projects addressed in the IDEA.

Adverse effects on waters of the United States could include filling, excavating, flooding, draining, clearing, or similar changes affecting wetlands or open water areas. Direct impacts on wetlands would result from disturbances that occur within the wetland. Common direct impacts on wetlands include filling, grading, removal of vegetation, construction, and changes in water levels or drainage patterns. Most disturbances that result in direct impacts on wetlands are addressed through Federal and state wetland regulatory programs. Indirect impacts on wetlands can result from disturbances that occur in areas outside of the wetland, such as adjacent uplands and other wetlands or waterways. Common indirect impacts include the influx of surface water and sediments, fragmentation of a wetland from a contiguous wetland complex, loss of recharge area, or changes in local drainage patterns.

Grand Forks AFB has approximately 300 wetlands covering 305 acres. Two of the proposed projects analyzed in the IDEA have potential to cause minor, direct, adverse impacts on wetlands or other jurisdictional waters of the United States (e.g., dredging or placement of fill). These projects include Construct Base Civil Engineering Pavements and Maintenance Facility/Snow Barn (Project C2) and Construct Indoor Small Arms Range (Project C3). Four other projects are adjacent to or close to wetlands and other jurisdictional waters of the United States, including the following: Demolish Munitions Storage Area Revised Plan (Project D1), Construct Multi-Use Trail Along Eielson Street (Project C6), Construct Access Road/Parking at Buildings 314 and 242 (Project I1), and Repair Heating, Ventilation, and Air Conditioning-Ground Source Heat Pump at Building 652 (Project I2). All potential direct and indirect adverse impacts would be avoided to the maximum extent practicable through design and implementation of measures outlined in this document. Project design would be coordinated with Grand Forks AFB. A wetlands management plan for the installation also is currently being developed.

2. Laws and Regulations

Protection of wetlands and other waters of the United States is mandated by both Federal and state laws and regulations. At the Federal level, wetlands are protected as a subset of the waters of the United States under Section 404 of the Clean Water Act (CWA). The term “waters of the United States” has a broad meaning under the CWA and incorporates deepwater aquatic habitats and special aquatic habitats (including wetlands). The U.S. Army Corps of Engineers (USACE) defines wetlands as “those areas that are inundated or saturated with ground or surface water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated conditions. Wetlands generally include swamps, marshes, bogs, and similar areas” (33 Code of Federal

Regulations [CFR] Part 329). Section 404 of the CWA establishes a program to regulate the discharge of dredge and fill material into waters of the United States, including wetlands. Grand Forks AFB would be required to obtain a Section 404 Standard Individual Permit or applicable Nationwide Permit from USACE if proposed projects are determined to adversely impact wetlands on the installation through dredging or placement of fill within wetlands. The USACE, pursuant to Section 404 of the CWA, requires compliance with the Section 404(b)(1) guidelines for wetland filling activities that are deemed “non-water-dependent.” Non-water-dependent projects do not need to be located in wetlands or other waters to fulfill their basic project purpose. These guidelines first require avoiding impacts through selection of projects with the least environmental effect, and second, through taking the appropriate and practicable steps to minimize impacts. Lastly, wetland compensation would be required for any loss of wetlands, pursuant to the “no net loss” national policy for wetlands.

Section 401 of the CWA requires state agencies to evaluate projects that will result in the discharge into waters of the United States to determine whether the discharge will violate the state’s water quality standards. Per Section 401 of CWA, any applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which could result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the state in which the discharge originates or will originate. North Dakota relies on Section 401 water quality certification as its primary form of state-level wetlands regulation. The Section 401 program is administered by the North Dakota Department of Health, Division of Water Quality (NDDH/DWQ). In making certification decisions, the NDDH/DWQ is primarily concerned with the construction and environmental disturbance requirements pertaining to soils, surface waters, and fill materials. A non-regulatory agency policy document requires that “fragile and sensitive areas such as wetlands, riparian zones, delicate flora, or land resources will be protected against compaction, vegetation loss, and unnecessary damage.” If a project does not meet this and other minimum requirements of the NDDH/DWQ, the permit is denied, and necessary conditions are communicated before re-application. A Section 401 Water Quality Certification is required for activities that require Federal permits such as a Section 404 permit. Mitigation or compensation for the impacts made on wetlands or other waters of the United States would be required in order to comply with the “No Net Loss” national policy.

Executive Order (EO) 11990, *Protection of Wetlands*, (May 24, 1977) directs agencies to consider alternatives to avoid adverse effects and incompatible development in wetlands. Federal agencies are to avoid new construction in wetlands, unless the agency finds there is no practicable alternative to construction in the wetland and the proposed construction incorporates all possible measures to limit harm to the wetland. Agencies should use economic and environmental data, agency mission statements, and any other pertinent information when deciding whether or not to build in wetlands. EO 11990 directs each agency to provide for early public review of plans for construction in wetlands. In accordance with EO 11990 and 32 CFR Part 989, a Finding of No Practicable Alternative (FONPA) must accompany the Finding of No Significant Impact (FONSI) stating why there are no practicable alternatives to development within or affecting wetland areas.

It is U.S. Air Force (USAF) policy to avoid constructing new facilities within areas containing wetlands, where practicable. Proposed actions that could impact wetlands, even if the affected area is not within a jurisdictional wetland boundary, require an environmental impact analysis in accordance with NEPA and the USAF Environmental Impact Analysis Process at 32 CFR Part 989. The proposed action must include all practicable measures to minimize harm to wetlands.

3. Environmental Protection Measures for Wetlands and Other Waters of the United States

If a project is anticipated to affect wetlands or other waters of the United States, a sequence of actions has been identified to offset effects, known as the mitigation sequence to guide mitigation decisions and determine the type and level of mitigation required under the CWA Section 404. The sequence of steps are to avoid, minimize, and, lastly, compensate. If effects on a wetland cannot be avoided, they must be minimized. Following minimization, any unavoidable impacts must be compensated. Compensation can include restoration, creation, enhancement, or preservation of a wetland. This document focuses on techniques to avoid or minimize effects on wetlands or other waters of the United States.

3.1 Avoiding Effects on Wetlands or Other Waters of the United States

Avoidance of effects on wetlands or other waters of the United States results in the least environmental effect on these resources. Avoidance can be most effective through project design that sites a project in an area that would result in no direct or indirect effects on wetlands or other waters of the United States. In addition to avoidance through design, effects could be avoided by flagging the boundary of a wetland or water of the United States to delineate areas to avoid, and ensuring construction vehicles and workers remain outside of the flagged boundary.

3.2 Minimizing Effects on Wetlands or Other Waters of the United States

If impacts cannot be completely avoided, reduction of effects is evaluated based upon type and extent of the impact on the wetland or waters of the United States. Indirect effects could occur on wetlands or other waters of the United States that are in proximity to proposed project activities. Implementation of the following management practices where appropriate would minimize potential for indirect impacts on wetlands and other waters of the United States that are adjacent to proposed activities:

Construction Controls

- The wetlands and other waters of the United States should be clearly flagged prior to commencement of construction activities. This would prevent construction workers from entering these wetlands and potentially placing fill within the wetlands or trampling wetland vegetation.
- Construction activities should be phased so that smaller areas of land are disturbed at one period of time. This would result in less soil exposed at one time, and would reduce the potential for erosion and deposition of sediment into wetlands or other waters of the United States.
- Water quality control features such as sedimentation basins and detention or retention ponds should be installed as applicable prior to initiation of construction activities. Temporary basins and silt traps would be constructed as necessary to contain sediment and runoff on the construction area. Hay bales and silt fences should be used to minimize transport of sediments off the project area.
- All fuels and other potentially hazardous materials should be contained and stored appropriately. In the event of a spill, procedures outlined in the installation's Spill

Prevention, Control, and Countermeasure Plan (SPCC) would be followed to quickly contain and clean up a spill.

- An erosion and sediment control plan should be developed prior to initiation of construction activities and adhered to during development.
- Erosion-control structures should be installed downgradient of the construction site in sloped areas adjacent to wetlands and other water bodies. The structures should be regularly maintained and removed once vegetation has been reestablished.
- A construction grading plan should be developed to show existing and proposed topography. Grading should be conducted in a manner that would direct storm water runoff generated from construction activities away from nearby wetlands or waters of the United States, but existing drainage patterns and hydrology should be maintained. Best management practices such as installation of silt fencing along wetland buffers would aid in prevention of siltation if natural site hydrology directs storm water runoff to the wetlands.
- Access paths should be located along high ground, or docks or boardwalks should be used when necessary to cross a wetland rather than filling the wetland. Storm water runoff originating from the construction site should be diverted and sedimentation controls implemented to avoid discharging into the wetland.
- When wetland crossings cannot be avoided, the use of heavy machinery in wetlands should be minimized by installing construction barriers at the edge of the proposed area of disturbance.
- Construction activities should be restricted to drier periods during the year (summer months).
- Construction debris should be disposed of at a suitable nonwetland site.

Natural Resources Controls

- A Storm Water Pollution Prevention Plan (SWPPP) should be developed and implemented to prevent surface water degradation of wetlands within close proximity of project sites.
- Storm water runoff originating from impervious surfaces should be routed through storm water treatment facilities prior to discharging into surface waters. Existing drainageways should be preserved. Water should not be diverted away from or towards wetlands and other waters of the United States. This aids in maintaining the existing hydrology.
- A buffer surrounding wetlands and waters of the United States should be established on wetlands identified at Grand Forks AFB. Buffers reduce adverse effects of development, most importantly in relationship to slope and vegetative cover. Maintaining dense shrubs or forested vegetation in areas with steep slopes provides the greatest protection from polluted runoff. In addition, buffer effectiveness increases with buffer width. As buffer width increases, the effectiveness of removing sediments, nutrients, bacteria, and other pollutants from surface water runoff increases.
- Removal of vegetation should be minimized. In areas where excavation is not proposed but vegetation removal is necessary, vegetation should be cut at the ground level, leaving roots intact. Disturbed areas should be seeded, sodded, or planted with indigenous material as soon as possible after construction activities are completed, as appropriate.
- The spread of noxious weeds can be controlled by avoiding activities in or adjacent to heavily infested areas, removing seed sources and propagules from the site prior to conducting activities, or limiting operations to nonseed-producing seasons. Following activities that

expose the soil, mitigation can be achieved by covering the area with weed-seed free mulch or seeding the area with native species. Soil should be covered to reduce the germination of weed seeds, maintain soil moisture, and minimize erosion.

- Areas where wetland soils have been disturbed should be monitored for nuisance or invasive plant species for 5 years following construction. Two such species are purple loosestrife (*Lythrum salicaria*) and common reed (*Phragmites australis*).

4. Project-Specific Considerations

During the design phase and prior to submitting necessary permit applications for any direct wetland impacts, a more detailed analysis for avoidance and minimization of effects would be conducted for each proposed project. Proposed projects would be designed to avoid direct impacts on wetlands and other waters of the United States. If direct effects could not be avoided, mitigation and correspondence with regulatory and resource agencies would commence, and permitting would be obtained. Direct effects would be expected for the proposed projects, Construct Base Civil Engineering Pavements and Maintenance Facility/Snow Barn (Project C2) and Construct Indoor Small Arms Range (Project C3); and avoidance, minimization of effects, and mitigation would be implemented, as necessary. Additional specifications would be developed as appropriate for each proposed project. The final specifications could include specific minimization techniques and the development of management plans for storm water runoff, vegetation, grading, and any other appropriate planning documents.

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